ELECTRICAL REVIEW

THE OLDEST ELECTRICAL PAPER

ESTABLISHED 1872

Vol. CXLV. No. 3746
9th SEPTEMBER, 1949

1889-1949

A NOTEWORTHY DIAMOND JUBILEE

THE duty of a generating station designer is two-fold. He must first choose from the plant available to him that which is likely best to fulfil the requirements to be satisfied. Then he has to arrange it in one of the several ways in which various items may, in principle, be associated so that the whole is economic according to the standard prevailing for the time being. Neither of these obligations can be carried out without a wide knowledge of most branches of engineering, some of which have progressed remarkably since the beginning of this century.

The Indispensable Turbine

As there is always an exception to prove the rule, there is one respect in which the power plant designer has not a free choice. The turbine is the only means he has, now, of driving large electricity generators. The water wheel is one of the oldest mechanical contrivances and the steam turbine is the earliest heat engine of any kind, yet it has reached its present state of perfection in the normal span of an ordinary man's active life. To have progressed in size from less than 100 kW to well over 100,000 kW in sixty years is indeed remarkable.

The story of this development is largely also the history of the Heaton Works, the name of whose founder is respected by power engineers, marine and land, in every country of the world. The first published reference to the possibility of generating a.c. by a high-speed alternator was in the discussion on a paper dealing with the Parsons compound steam turbine read in 1888 at the Institution of Mechanical Engineers in London.

In the following year the first commercial set, of 75 kW single-phase, was installed and two years afterwards a 100 kW set was built which was notable for being driven by the first condensing steam turbine. During the next three or four years the capacity of single machines was doubled with an armature less than one-third greater in physical size than that of the original machine.

It was about that time that the first Parsons turbo-dynamo was installed in the United States and the man who went with it from Newcastle stayed with the Westinghouse organization for forty years.

World-Wide Advance

Performance was so satisfactory that turbines were selected instead of reciprocating steam engines for several power stations in England. Orders came in 1896 from India, Australia and Russia. Attention had by then been turned to turbines for ship propulsion and for driving machinery other than electricity generators. Not only did the demand increase, but the size of machines grew rapidly also: to 6,000 kW two-cylinder tandem sets in 1908 with an important advance in 1912 to a 25,000 kW set for the United States.

While the capacity of turbine plant constructed at the Heaton Works up to 1900 totalled only 33,113 kW, it had risen by 1920 to 854,570 kW and at the be-

ginning of this year had reached 7,400,000 kW. Parsons' life work is too close to be seen in proper perspective yet, but few of us pause to think where we should now have been without the development of the steam power station.

What then of the next sixty years? The gas turbine principle had been described in the April, 1884, patent specification of the Parsons compound steam turbine, but Sir Charles did not again turn to it until the later years of his life. One small (but relatively large first) gas turbo-generator has already been made and installed; three much larger sets are being built for England and a fourth for Scotland. Is there a man brave enough now to forecast the outcome of a comparison of operating results in relation to capital costs?

BOARD HELPS CONTRACTORS

Co-operation between the Electricity Boards and private installation contractors is aimed at in the recent declaration of policy by the British Electricity Authority. In one area, at least, contractors are benefited by a sort of unpremeditated co-operation. Mr. A. Melvin Turner, writing in the *Electrical Contractor*, says that, although the Birmingham contractors are no believers in nationalized "supply," they admit that the policy of inspecting and reporting on installations pursued by the North-Western Electricity Board is to some extent educating the public in the difference between good and bad installations. He says that a good deal of work originates in these reports, including the complete renewal of old installations.

BELOW OR ABOVE GROUND?

Major G. C. Milnes has entered into the discussion upon the effects of power lines on the beauty of the Lake District. Major Milnes, who was city electrical engineer at Lancaster for many years, is reported by the *Manchester Guardian* to have taken electricity to hill farms and cottages around Lancaster "without a blemish on the landscape and at a cost well in line with other authorities." He had put 400 miles of cables under ground and four miles overhead in the space of ten years. Major Milnes refutes the idea that overhead lines are cheaper to maintain than underground cables; he reckons that £250,000 worth of cable costs no more than £150 a year to maintain. It seems, however, that most of the major lines in this district have been erected and the writer of the article admits, rather ruefully, that "familiarity is breeding resignation and even affection as it has done for telegraph wires." "Affection" is a strong term in this connection.

E.T.U. AND CONTRACTING

There are indications that the policy of the Electrical Trades Union is to press the Electricity Boards to undertake as much electrical contracting work as possible and ultimately to squeeze out the private contractor. This aim is largely political; the Union's members are unlikely to benefit much from the change. Moreover it conflicts with the recent statement on the subject by the B.E.A. which embodies a "live and let live" policy. The subject was discussed recently by E.T.U. officials with Mr. S. F. Steward, chairman of the South Western Board, who told them that while the Board would expand its existing installation departments it would not set up new ones where the consumers were already well served by private contractors. This is in the spirit of the agreement between the Boards and the contractors.

RURAL INSTALLATIONS

There is nothing new in the participation of electrical installation contractors in agricultural shows, but this year there seems to have been a much greater and wider representation. In the first place, this year has marked the introduction of a corporate display by the National Electrical Contractors' Trading Association (one of the E.C.A. trinity). A great deal of space is given in the September issue of the *Electrical Contractor* to this and to the stands arranged by individual members at some of the leading shows as well as at more local events. It is pleasing to see the private contractors endeavouring to hold their own in the rural sphere for the earliest farm electrification schemes employing private generating sets were put in by E.C.A. pioneers.

Liffey Hydro-Electric Scheme

Completion of its Development

By Our Dublin Correspondent

THE construction of the Leixlip water-power station has been practically completed and the plant is on the point of being brought into commission. With this achievement the work of developing the hydro-electric resources of the River Liffey—begun twelve years ago (in 1937)—is at last realized. The Leixlip station is the third and last link in the chain of three, the first and second being, respectively, Pollaphuca and Golden Falls. The accompanying map conveys an idea of the circuitous chain as it extends along the Liffey from the 100ft dam in the rocky gorge of Pollaphuca to the generating station at the Salmon Falls, near Leixlip.

The table overleaf shows that the group will provide 50 million kWh yearly and the country's annual output will then exceed 700 million kWh. Leixlip's individual contribution is a modest but welcome one (10 million kWh yearly), representing 1.5 per cent of the above-mentioned total.

The Electricity Supply Board began the Liffey development in 1937, eight years after the completion of the Shannon

Aerial view of the Pollaphuca hydro-electric station showing layout of dam and power house

scheme. The Liffey, rising in the Dublin mountains at a level of about 1,800ft, flows circuitously west over the plain of Kildare and after turning north and finally east, enters the sea at Dublin Bay; 82 miles long, it drains an area of over 500 square miles.

The Three Sites

There are several falls in the river; the three chosen for development are at Pollaphuca Bridge, where the main road from Dublin crosses the river; at Golden Falls, a mile downstream from Pollaphuca; and at the Salmon Falls, near Leixlip.

The erection of a 100ft dam in the rocky gorge at Pollaphuca was proposed to "pay a double debt," for it developed a 150ft fall in the river for power generation and also created a 5,000 acre reservoir of additional water for the city of Dublin by agreement between the E.S.B. and the Dublin Corporation.

From the dam, an intake tunnel about a quarter of a mile long leads the water from the reservoir to a surge tank overlooking the station, thence through the 200ft-long penstocks to the two 15,000 kW Kaplan turbines in the power house below. The first set began operating in 1944 and both are to-day in full commission.

The power generated, raised to 110 kV at the outdoor transformer station, is transmitted to Inchicore where it is delivered into the general transmission net-

Pollaphuca and the smaller station at Golden Falls is utilized as a compensation reservoir for equalizing the flow in the lower river when the first station is in operation. The water required by the main station when in full operation, if allowed down the river, would cause flooding. The compensation reservoir has sufficient capacity to contain the water required for 3½ hours' running at full load. The dam at Golden Falls creates a 60 ft head of water to drive a 5,730 h.p. turbine coupled to a 4,000 kW generator. At present a small staff operates this plant, but arrangements are being made to control it from Pollaphuca.

Between the towns of Celbridge and Leixlip the Liffey calls nearly 60 ft, and the Salmon Falls dam will transform the river into a narrow lake for about two miles upstream. At high-water level the lake will be about 100 acres in extent with a capacity of 160 million gallons. This station will be controlled from the transformer station at Inchicore.

Care of Salmon

The yearly migration of salmon upriver is a traditional feature of the Liffey at Leixlip. The conventional series of shallow-stepped pools that gradually lead the salmon, as up a stairway, over the barrier did not suit the design of the dam. A more unusual type of fish pass based on the principle of the canal lock will therefore be introduced. High on the upstream face of the dam there is an open

GENERAL PARTICULARS OF STATIONS

	POLLAPHUCA	GOLDEN FALLS	LEIXLIP
Storage H.W. level	618.0	458.0	149.0
Storage L.W. level (ft. O.D.)	580.0	444.6	141.0
Tail race max. level	458.0	395.5	88.2
Tail race min. level	444.6	388.5	84.5
Gross design head (ft.)	154.2	57.2	57.5
Number and rating of sets, kW.	2×15,000	1×4,000 1×250	1×4,000
Turbines, h.p.	2×20,000	1×5,730 1×340	1×5,800
Normal r.p.m.	300	1 at 187.5 1 at 750	300
Water per turbine at full load at average head in cusecs.	1,400	1,050	1,000
Average annual output (million kWh)	30	10	10

work. The station, for the last two years, has been generating at the rate of 30 million kWh/annum, generally for peak load use.

The mile-long stretch of water between

chamber connected by an enclosed sloping shaft to another chamber in the base at the back of the dam. At regular intervals the chambers with their connecting shaft are to be flooded and emptied by

Aerial view of the Golden Falls hydro-electric generating station

automatically operated sluice gates. The fish, attracted by the outflowing water, swim into the lower chamber and pass up through the connecting shaft into the top chamber, from which they are then released into the head water.

M.V. "Rangitoto"

Combined Cold Cathode and Tungsten Lighting Installation

THE New Zealand Shipping Co.'s passenger and refrigerated cargo motorship *Rangitoto* left Tilbury on her maiden voyage to New Zealand on 25th August. All the lighting equipment for the ship was supplied by the General Electric Co., Ltd., and in many of the public rooms lighting is from "Osram" cold cathode tubes of various colours and from tungsten lamps. The designs were prepared by the architects, Easton and Robertson.

There are twelve circular ceiling fittings, 4ft 9in. in diameter, in the dining saloon and children's dining room. Local lighting in the saloon is provided by twelve silver bronze bracket fittings, each with two 25 W lamps supported by off-white candle tubes.

Other large circular fittings are used in the large lounge and bar. These have an obscured peach coloured glass dish 3ft 6in. in diameter, and each contains six 100 W tungsten lamps. Standard lamps in the large lounge are fitted with the four-lamp Partridge device which enables some indirect lighting to be obtained by reflection from the ceiling when desired. Other standard and balustrade lamps with the Partridge device are located in the ladies' room, small lounge and dining room. Cold cathode lighting is used in the large lounge in conjunction with the circular ceiling fittings. The tubes are "warm white," and are fitted in cornices at both ends of the lounge. On the same deck is the Verandah Café, where the tube colours in the special 17ft fitting are ivory and gold. These colours are also used in the cocktail bar adjacent to the café.

The dancing space has a combination of gold cold cathode and tungsten lighting. "Warm white" cold cathode tubes are used in conjunction with tungsten lighting in the cinema. Here the cold cathode lighting is indirect from a cornice. The "A" and "B" deck forward stair halls have a combination of ivory and gold cold cathode tubes in the cornices, together with circular fittings for tungsten lamps and provision for concealed tungsten lamps to light the stairhall domes. Four special designs of ceiling, table and writing desk fittings were prepared for the private suites.

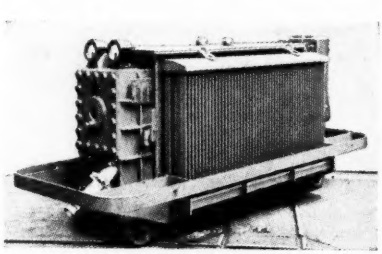
Scottish Industries Exhibition

Representative Display at Kelvin Hall, Glasgow

ON Thursday of last week, 1st September, Her Majesty the Queen opened the Scottish Industries Exhibition at the Kelvin Hall, Glasgow. This exhibition is representative of Scottish industry generally and the goods displayed by the 300 or so exhibitors may be grouped into 98 different categories. It would, however, not be true to say that the show is representative of Scottish engineering generally although the display of electrical items, some of which are mentioned below, is most impressive. This is the first time that an exhibition of this nature has been organized in Scotland, and as the Queen said in the course of her opening speech, the display is undoubtedly a wonderful achievement.

All of the firms displaying their products are manufacturing either wholly or partly in Scotland. For example, Sangamo, Weston, Ltd., are displaying the type HMT single-phase house service meter which is now being made north of the border. A representative selection of other meters, instruments, measuring equipment and accessories is also shown, and it is anticipated that in the future many of these products will be manufactured in the company's Port Glasgow works.

The instruments and meters displayed by the Metropolitan Vickers Electrical Co., Ltd., are samples of the products made at the company's Motherwell works. A new design of house service meter of the quarterly or credit variety, type NF, is also shown, and methods of examining meter jewels are demonstrated. Other exhibits include Newton-Victor X-ray apparatus and relays for overcurrent and earth-fault protection.



Mobile rectifier unit for use in mines. (*Bruce Peebles*)

Electrical measuring instruments for laboratory and general use are displayed by the Electrical Instrument Co. (Hillington), Ltd., as well as temperature indicators, recording pyrometers and thermocouples.

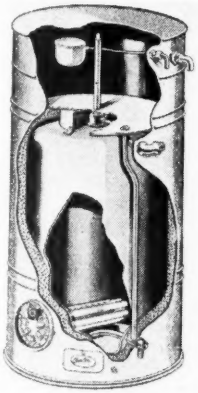
A model of a typical Scottish hydro-electric scheme is shown by Bruce Peebles & Co., Ltd., together with industrial and flame-proof motors and transformers and a mobile oil-immersed rectifier for charging locomotive batteries in coal mines. This set, which is arranged for automatic operation, is a one-piece unit comprising a low height transformer and metal rectifier mounted in a common tank and is provided with the necessary flame-proof a.c. and d.c. control equipment.

The stand of the British Electrical Development Association, which has been arranged in conjunction with the three Scottish Electricity Boards, illustrates the way in which electricity can be employed to speed up production. Models include those of typical Scottish hydro-electric schemes, a gas turbine and a steam generating station.

The display arranged by the Department of Scientific and Industrial Research is intended to let Scottish industrialists know how the organization works and what sources of technical research are available to all branches of industry. The exhibit includes a model of the new East Kilbride Mechanical Engineering Research Station.

Apart from a diversity of lamps and radio components Philips Electrical, Ltd., are showing a redesigned model of the "Philishave" electric razor which has just gone into production at the com-

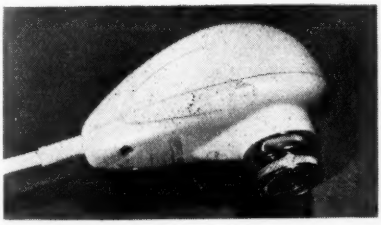
pany's works at Hamilton, Lanarkshire. It incorporates a system of rotating blades and is housed in a white moulded casing of modern appearance. The two-pin plug incorporates a resistance with a switching arrangement which permits the shaver to be used on any voltage between 100 V and 250 V, a.c. or d.c.



Cistern-type water heater (*British National Electrics*)

Duncan Low, Ltd., display a wide range of equipment on their stand including immersion heaters for oils and acids and steam raisers for sterilizing dairy and ice-cream utensils. An interesting appliance shown for the first time is the "Rosslow" electric washtub. This is a heavy fireclay combined sink and washtub set in one piece, white enamelled inside and outside. A 4 kW immersion heating element fitted in a sump in the tub compartment is protected by a chromium-plated cover. A three-heat control switch and pilot lamp are provided and the heating element is furnished with an automatic thermal cut-out.

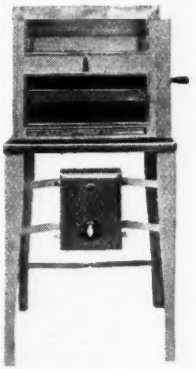
A representative collection of domestic cookers and water heaters shown by British National Electrics, Ltd., includes the "Charlton" cistern-type water heater which is a complete hot water system in one unit. Within its outer case it contains a ball-valve supply tank, hot water storage tank, a 3 kW bank of heating elements and an expansion pipe which exhausts back into the self-contained supply tank. No other tanks are needed, and the only pipework required is the cold water feed, the hot water delivery and an overflow.



Redesigned "Philishave" electric razor (*Philips*)

Heavy duty cooking equipment and electric fires are shown by Carron Company, together with the H2 domestic cooker which incorporates two pilot lights in the splashplate, one for the 2 kW grill-boiler and the other for the 1.8 kW hot-plate. The oven is thermostatically controlled, loaded at 2.2 kW and measures 13in high, 13.25in wide and 14.5in deep. The cooker is constructed of cast iron and sheet steel and is finished in vitreous enamel. If required, a metal fixture is available for attaching to the side of the cooker on which an electric kettle can be placed.

Among a diversity of household fittings, Altones Ltd., Newhouse Industrial Estate, Motherwell, show "Altone" decorative bed-lamps, lanterns, table lamps and wall lamps, which are made from aluminium pressings in a variety of colours. Synchronous electric clocks and alarms shown by Clyde Clocks (British & Foreign Agencies, Ltd.), 37, Colvend Street, Bridgeton, Glasgow, S.E., are housed in cases of moulded material, mirrored glass, wood and alabaster.

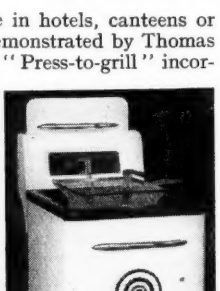


"Press-to-grill" for hotels and ships (*Thomas Bishop*)

On the stand of Scott & Wilson (Refrigeration), Ltd., is the "Vortex" ice-cream processing machine which meets all new regulations. The processing is done in one container and the mix is thoroughly broken up while being pasteurized and cooled. The emulsifying pump, which forms an integral part of the unit, gives a complete dispersal of

fats and solids throughout and these remain in suspension after processing. The machine incorporates three 3 kW thermostatically controlled immersion heaters and the pump is driven by a 1 h.p. single- or three-phase motor. A milk cooler of novel and compact construction is also shown.

A griller for use in hotels, canteens or ships' galleys is demonstrated by Thomas Bishop, Ltd. This "Press-to-grill" incorporates a 5.5 kW heating element with three-heat control and is equipped with a means of varying the grilling height, the grilling area being about 3 sq ft. Other heavy duty cooking equipment on the same stand includes a three-pan fish frying range and a four-chamber baking oven.



"Visidual" deep fat fryer (*John Kelly*)

A newly designed fryer shown by John Kelly & Son, is intended for all manner of deep-fat frying in hotels and restaurants. It is loaded at 8 kW and equipped with automatic control, thereby rendering its operation economic and preventing overabsorption of fat. The exterior is enamelled white or cream and the interior of the pan is coated with black acid-resisting enamel.

The "Emulsor" on the stand of the Hunter Machines Co., Ltd., is an electrically driven machine for dissolving, mixing, emulsifying, homogenizing, pasteurizing and cooling. Sizes from 6 pints up to 500 gallons are available for batch and continuous process.

The PC electrically driven mixer shown by Joseph Potts, Ltd., is intended for use in restaurants and is available as a single, twin or quadruple unit. The beakers are totally enclosed when mixing, thus eliminating splash and noise, and the finish is stainless steel.

An interesting range of heavy duty mixing machines, whisks, and other equipment for confectioners and bakers is exhibited by the Morton Machine Co., Ltd.

A new company, Kelvin & Hughes (Industrial), Ltd., which has been formed to market the industrial instruments previously sold by Kelvin, Bottomley & Baird, Ltd., and Henry Hughes & Son, Ltd., is displaying marine radar equipment, "Ampro" cine projectors, flowmeters, boiler house instruments, supersonic flaw detectors, pen recorders and a selection of industrial electronic instruments.

Flameproof Switchgear

Apart from flameproof switch and control gear, W. & H. Nelson, Ltd., show a 16 h.p. cam-operated winch controller for d.c. working. It gives series control on hoisting and potentiometer controlled lowering. A feature of this unit is the time lag provided on the contactor fingers, which prevents heavy current flow through the motor when the operator "notches up" too rapidly.

M. & C. Switchgear, Ltd., display switch and control gear with enclosures to suit conditions in all industries, including coal mining. One interesting item is a device for the sequence control of conveyors by means of a "Sentryfuge" switch fitted to the conveyor. When the belt speed reaches a certain value the switch closes and starts the conveyor next in sequence. In the event of dangerous belt slip or breakage the main driving motor is automatically stopped.

Flameproof and industrial switchgear for use on voltages up to 660 is displayed by the Belmos Co., Ltd., together with motor starters, control gear, resistors, transformers and accessories.

The "Blantex" carton-sealing unit exhibited by Jackson & Crockett, Ltd., is intended for situations where the installation of expensive automatic machinery is not economic. It is self contained, and is driven by a $\frac{1}{8}$ h.p. motor; it has an electrically heated sealing device, and is capable of an output of from 12 to 20 packets per minute.

The "Possil" saw-sharpening machine shown by H. A. McQueen & Co., Ltd., is driven by a 0.5 h.p. motor and is suitable for both straight and circular saws. It enables a wide variety of work to be

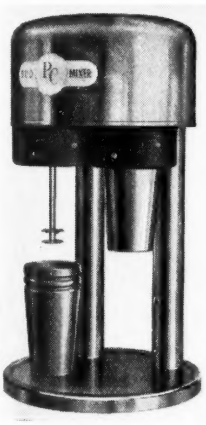
dealt with and the readily adjustable settings permit any type of tooth to be quickly sharpened irrespective of shape. The "Paismac" meter intake panel on the same stand simplifies cabling between meters and cut-out fuses and eliminates exposed v.i.r. tails.

"Hicycle" portable electric tools including a new flareproof coal drill, are shown by the Consolidated Pneumatic Tool Co., Ltd., with portable and stationary air compressors, mining equipment, pumps and pneumatic tool accessories.

A model on the stand of Babcock & Wilcox, Ltd., illustrates the kind of coal and ash handling plant which is associated with modern power station boiler houses. Examples of boiler house plant and accessories are also exhibited together with a recently introduced automatic lighting up burner for oil fired furnaces.

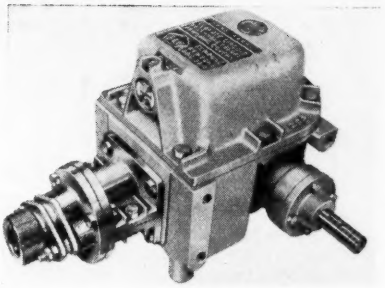
The Harland Engineering Co., Ltd., shows samples of some of its smaller products including centrifugal and submersible pumps, motors and a sectional electric drive for paper making machinery. Photographs and models illustrate the company's wide range of heavier products.

Fractional h.p. motors comprising split-phase capacitor-start and three-phase models are shown by Hoover, Ltd., as well as special types for refrigeration applications.



"PC" twin unit mixer (*Potts*)

Apart from a range of domestic vacuum cleaners with either internal or external bags the British Vacuum Cleaner and Engineering Co., Ltd., is displaying a washing machine with large tub capacity and folding wringer which may be stored under a sink. Vactric, Ltd., demonstrates electric suction cleaners and floor polishing machines and in addition is showing a new domestic food mixer.



Flameproof sequence control switch (*M. & C. Switchgear*)

Plant for Brisbane

THE Australian *Electrical Engineer and Merchandiser* reports that Brisbane City Council has decided to duplicate the plant at present on order for the new Tennyson power station and is to make every effort to have it available for service by the winter of 1954. The plant on order comprises two steam boiler units, each of 160,000 lb/hr, and one 30 MW turbo-alternator. It is scheduled to be in service by October, 1952. The present capacity of the Council's New Farm power station is 75 MW. The City Electric Light Co., Ltd., also has plant on order, comprising two 30 MW turbo-alternators with boiler plant, for installation in a new station, Bulimba "B" next to the "A" station (capacity 95 MW). Revised estimates show that the load is likely to increase at a much greater rate than anticipated and that the fourth new unit on the combined system (the second machine at Tennyson) will be needed before the winter of 1954 instead of 1955.

A.S.E.E. Branch Meetings

ON Tuesday next the South West London Branch of the Association of Supervising Electrical Engineers is holding a meeting at the showrooms of Falk, Stadelmann & Co., Ltd., Mount Street, Park Lane, W.1, at 7.15 p.m., when Mr. E. A. Langsdon will give a paper on "Lighting Design."

On Wednesday the Bradford Branch of the Association is holding a meeting at the Midland Hotel, Bradford, at 7.30 p.m., when Mr. J. W. Robertshaw will speak on "Power Factor Testing."

Views on the News

By REFLECTOR

IT seems to be the practice of two of the Electricity Boards, at least, to dispense with the customary formality in expediting the payment of accounts. In one case, after 28 days, and in the other after 14 days, following the despatch of the accounts, the laggard consumers are confronted with a notice threatening them with disconnection at the end of seven days. Something seems to have gone wrong in one district where people have received the "cutting-off" threat before they have had their accounts. Reports indicate that, although some resentment has been aroused, the method is very effective in bringing in the money.

★ ★ ★

It was recently pointed out in the *Electrical Contractor* that an admirable folder giving the names and addresses of all members of the Birmingham branch of the Electrical Contractors' Association showed that only 26 out of the 86 announced a 24-hour service. In the September issue, Mr. W. A. Gazard, one of the Birmingham members, says that this was done in self-defence. The other members' clients know that they can obtain service "out of hours," but the publication of night telephone numbers, etc., is likely to attract mere "casuals" who will call up contractors at night in an emergency, but discard them afterwards. Of course, there is such a thing as casting bread upon the waters—even night-baked bread.

★ ★ ★

When the Merseyside and North Wales Electricity Board acquired the Southport electricity undertaking, one of the "assets" taken over was an illuminated fountain outside the Lord Street electricity showrooms. It now appears that the Board does not want the fountain, and, according to the *Southport Guardian*, has suggested that the town should have it back—for a payment. The Corporation contends, however, that the fountain was a "gift" to the town from the Electricity Department on the occasion of the present King's Coronation. I suppose it was in order for the Electricity Department to incur a "working expense" of this kind; if it was, it seems strange that the Corporation did not assert its claim to the fountain on or before Vesting Day.

★ ★ ★

People living in the village of Illey, near Halesowen (Worcs) want electricity but decline to pay the price quoted by the Midlands Electricity Board. There is the usual complaint that, though there are "pylons" in the village, the inhabitants cannot be connected for next to nothing. One farmer is reported to have said that when generators are cheap enough he will buy one and make his own electricity. Another inhabitant, on the other hand, says that he has never been used to electricity, and doesn't want it even if it is free. "Give me the old oil lamp," he remarked. I can think of easier jobs than that of the rural development officer.

★ ★ ★

In the August issue of *Seaboard*, the magazine of the South-Eastern Electricity Board, a correspondent complains of the growing tendency to bestow high-flown titles. He says, for instance, that an advertisement recently called for an assistant service centre supervisor, "which position was known—before All Fools' Day, 1948—as showroom assistant."

★ ★ ★

Strange juxtaposition of items in "Notes from the News" in the *Electrical World* of 20th August:—

> ". . . A Jap has come up with what drinking men will hail as one of the greatest uses of electricity. Using a 'secret' electrical process, he is converting sweet potato alcohol into rye, bourbon or Scotch. Scotch can be 'aged' 15 years in 12 minutes. . . . The National Association of Corrosion Engineers will conduct a 'Short Course in Corrosion,' Sept. 12-16, at the University of Texas, Austin."

★ ★ ★

Another flash from the *Electrical World*: "Rural electrification is an ill wind that hasn't blown the windmill manufacturers any good."

Star-to-Delta Conversion

Evaluating Currents in Unsymmetrical Star-connected Impedances

By "SIGMA"

THE delta-to-star conversion is frequently used in the solution of practical network problems, as it is a useful method of finding the combined resistance of a complicated network without resort to the troublesome technique required by the application of Kirchhoff's laws. The reverse conversion, star-to-delta, is not so popular, but is worthy of note because it constitutes a straightforward method of evaluating the currents in an unsymmetrical set of star-connected impedances when they are connected to a three-phase supply. The currents entering the primary star and the equivalent delta are the same and, as the components of the latter are joined directly to the lines of the three-phase supply, the currents in them can be calculated directly.

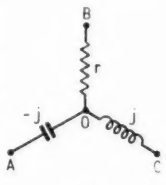


Fig. 1

If Z_A, Z_B and Z_C are respectively the impedances of the three star-connected components, joined to terminals A, B and C of the supply, and Z_{AB}, Z_{BC} and Z_{CA} are the impedances of the equivalent delta joined respectively to terminals AB, BC and CA then $Z_{AB} = Z_A Z_B Y$, $Z_{BC} = Z_B Z_C Y$, $Z_{CA} = Z_C Z_A Y$ where Y is the admittance of Z_A, Z_B and Z_C when connected in parallel.

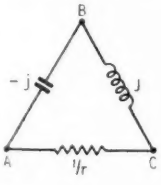


Fig. 2

The star-to-delta conversion is useful for investigating the characteristics of some unusual star-connected combinations when joined to a balanced-voltage three-phase supply. Consider Fig. 1, in which Z_A is a capacitor of 1Ω impedance represented symbolically by −j, Z_B is a resistor of ohmic value r, and Z_C an inductor of 1Ω impedance represented by j. As the admittance of the capacitor and inductor in parallel is zero, the combined parallel admittance Y is $\frac{1}{r}$ and the three components of the equivalent delta (Fig. 2) are $Z_{AB} = -j$, $Z_{BC} = j$, $Z_{CA} = \frac{1}{r}$.

It will be noted that this star combination has two curious features. If r = 1 the three star components can be reconnected in delta as an equivalent combination which will draw the same currents from a three-phase supply. As the currents entering terminal B of the delta depend only on the impedances of the capacitor and inductor, the current flowing through the resistor is independent of its ohmic value. If the line voltages of the three-phase supply are balanced and have the value V, the currents from terminal B of the delta are each V amperes; one leads and the other lags the line voltage by 90 deg so that their phase difference is 120 deg. The resultant current entering the delta at B and hence the current in the resistor is V amperes in phase with

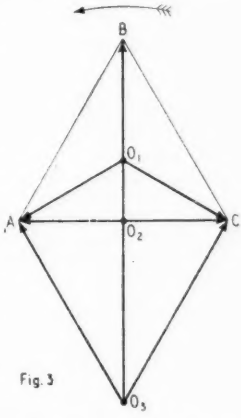


Fig. 3

the B line-to-neutral voltage of the supply, for all values of r.

In Fig. 3, ABC is the triangle of balanced line voltages. As the current in the resistor has a constant value of V amperes, the voltage drop across it will be Vr, its vector being on the line bisecting the angle at B. If r = o the star reduces to a vee combination of capacitance and inductance, the line currents each having the value V amperes and together forming a balanced system of negative phase sequence because the line current I_A leads the line current I_C by 120 deg.

If $r = \frac{1}{\sqrt{3}}$ the voltage drop in the resistor of the star combination will be $\frac{V}{\sqrt{3}}$ and it will be represented (Fig. 3) by the vector O_1B, O_1A and O_1C being the vectors of the voltage drops in the capacitor and inductor. These are all equal, and the common connection of the three star components is at the same potential as the neutral of the supply source.

The currents I_A and I_C each have the value $\frac{V}{\sqrt{3}}$ amperes and the system of currents entering the combination is of reverse phase sequence, I_A leading I_C by 60 deg.

If $r = \frac{\sqrt{3}}{2}$ the voltage drop in the resistor is $\frac{\sqrt{3}V}{2}$, and the associated vector is O_2B (see Fig. 3). The voltage drops O_2A and O_2C in the capacitor and inductor are each $\frac{V}{2}$; the corresponding currents are $\frac{V}{2}$ amperes and are in phase. The three currents from the supply form a single-phase system.

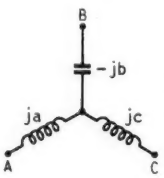


Fig. 4

When $r = \sqrt{3}$ the drop in the resistor is $\sqrt{3}V$ and its vector is O_3B (Fig. 3). The vectors O_3A and O_3C of the voltage drops in the capacitor and inductor each have the magnitude V; the currents I_A and I_C are each V amperes and the three currents form a balanced system of normal or positive phase sequence. This star-connected combination taking a balanced load from the supply is anomalous because there is a difference of potential of $\frac{2V}{\sqrt{3}}$ volts between the supply neutral and the common connection of the star-connected components. The unbalance factor of the currents entering the star combination is defined as the ratio of the negative to the positive sequence component. As r changes from $\sqrt{3}$ to zero, the unbalance factor changes from zero to infinity, becoming unity when $r = \frac{\sqrt{3}}{2}$.

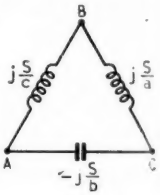


Fig. 5

The three-phase power factor is unity for all values of the line currents.

Another interesting star combination (Fig. 4), comprises two inductors the impedances of which have the vector values ja and jc together with a capacitance, the impedance of which is –jb. The parallel admittance is $j\left(\frac{1}{b} - \frac{1}{a} - \frac{1}{c}\right)$ which becomes j. $\frac{S}{abc}$ where S = (ca – ab – bc).

The impedances of the equivalent delta (Fig. 5) are given by the equations $Z_{AB} = j\frac{S}{c}$, $Z_{BC} = j\frac{S}{a}$, $Z_{CA} = -j\frac{S}{b}$. The lagging VAr in the inductive branches of the delta when it is connected to a balanced-voltage three-phase supply will be $\frac{V^2}{S}(a + c)$ and the leading VAr in the capacitor will be $\frac{V^2}{S}b$. The net VAr taken from the supply by the delta combination and hence by the primary star combination will be zero when b = a + c, that is when the ohmic impedance of the star capacitance is equal to the sum of the ohmic impedances of the two star inductors. In this condition the currents entering the star combination will form a balanced system of negative phase sequence.

I.E.E. Section Chairmen

OFFICERS FOR THE 1949-50 SESSION

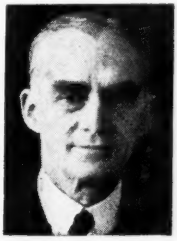
IN our issue of 8th July we gave the names of the chairmen of the Sections of the Institution of Electrical Engineers for the 1949-50 session. We now publish brief biographies of the new chairmen, together with their portraits.

Prof. J. Greig, M.Sc., Ph.D. (Measurements Section) was educated at George Watson's College and the Heriot-Watt College, Edinburgh, and at University College, London. After serving an apprenticeship with his father's firm, George Callam & Co., and with Wm. Douglas & Son, Edinburgh, he had several years' experience in industry, first with the Bell Telephone Co. of Canada, Montreal (1924-26) and subsequently on the research staff of the General Electric Co., Ltd., at Wembley (1928-33). His first university appointment was as assistant lecturer at University College, London (from 1933 to 1936), and in the latter year he became lecturer at Birmingham University. He returned to London in 1939 as head of the Electrical Engineering Department of the Northampton Polytechnic, leaving this post in 1945 to take up his present position as William Siemens Professor of Electrical Engineering, King's College, Strand, W.C.2. Prof. Greig's industrial experience has been mainly on the light current side, first in the telephone field and later on high power radio frequency valve circuits. During the war he was concerned with radar and radio training for Services personnel. While in the University of Birmingham he became interested in magnetic measurements, in which field he has pursued experimental research in recent years. Prof. Greig is a senior member of the Institute of Radio Engineers, New York.

Prof. J. Greig

Mr. R. T. B. Wynn

Mr. C. T. Melling



Mr. J. W. Leach

Mr. R. T. B. Wynn, M.A., C.B.E., (Radio Section), is assistant chief engineer to the British Broadcasting Corporation. Mr. Wynn received his education at Uppingham School and Trinity Hall, Cambridge, and his practical training with Siemens Bros. & Co., Ltd., Woolwich. From 1917 to 1919 he served in the Royal Flying Corps (later R.A.F.), and from 1922 to 1926 he was on the designs staff of Marconi's Wireless Telegraph Co., Ltd., at Writtle, near Chelmsford. In the last-mentioned year he commenced his association with the B.B.C. as head of the Engineering Information Department. He was appointed head of the Operations and Maintenance Department in 1934, and in 1943 took up his present post of asistant chief engineer.

Mr. C. T. Melling, M.Sc.Tech., M.I.Mech.E., M.Inst.F., M.I.I.A. (Utilization Section), is chairman of the Eastern Electricity Board. He received his early education at the Central High School, Manchester, and took an electrical engineering course at the Manchester College of Technology (University of Manchester), where he gained the degree of M.Sc.Tech. After practrical training in the Rugby works of the British Thomson-Houston Co., Ltd., and the Metropolitan-Vickers Electrical Co.'s works at Manchester, Mr. Melling joined the Yorkshire Electric Power Co. in 1934 as assistant engineer. In 1935 he was appointed personal assistant to the general manager of Edmundsons Electricity Corporation, Ltd., in which position he was able to specialize in electricity supply economics, and he presented a paper to the I.E.E. on "General Factors Affecting the Unification of Electricity Supply Tariffs," for which he was awarded the Llewelyn B. Atkinson Premium. He left Edmundsons in 1943 to become borough electrical engineer at Luton, which position he held until his appointment with the Eastern Electricity Board last year.

Mr. J. W. Leach (Supply Section), retired from the position of chief engineer of the London Electricity Board at the end of February last, although he has since been assisting the Board in the completion of certain work. Mr. Leach received his training with the British Thomson-Houston Co., Ltd., and was subsequently in charge of its construction work in London and the South of England, engaged on contracts for generating stations, distributing systems, railway electrification and industrial concerns. He later became manager of the company's London office and in that capacity was concerned with the early contracts for the grid system. Mr. Leach joined the Westminster Electric Supply Corporation in 1933, which was later combined with five other London companies to form Central London Electricity, Ltd., and in 1940 he was appointed engineer-in-chief of this company.

Mr. Leach became chief engineer of the London Electricity Board in January, 1948. In 1942 he was awarded the Ferranti Premium by the I.E.E. for his paper on "The Standardization of Distribution in Densely Loaded Areas."

NEW BOOKS

Induction Heating. By N. R. Stansel. Pp 212; figs. 162. McGraw-Hill Publishing Co., Ltd., Aldwych House, London, W.C.2. Price 21s in U.K.

The author, who is a member of the senior technical staff of the American General Electric Company and an authority on medium frequency eddy current heating, has aimed at presenting the electrical and thermal principles of eddy current heating and showing how these are applied. He has succeeded, although the omission of details on generating equipment is perhaps to be regretted.

The book builds up from basic principles but demands a reasonable standard of technical knowledge. It gives the relation of electrical, magnetic and thermal properties of conductive materials (metals and alloys), of frequency and of the dimensions and shapes of the bodies to be heated. Numerous equations with accompanying graphs are given. Derivations are not included, but references are provided for those readers who are interested in the theoretical aspect of induction heating.

The author considers quite rightly that the most important data required are the resistivity and impedance values of the materials at the temperatures specific for heat applications. Chapters IV and V (Circuit Equations and Circuit Analysis) deal with effective values under operating conditions, while a useful appendix provides tables covering metals, alloys, hollow copper conductors and the heat content of carbon steels.

Chapter VI gives a brief description of the most important Class A (heating metals) applications. Chapter VII deals with Class B (melting metals) problems. This is an interesting review of current types of induction furnaces and their operation. The last chapter gives particulars for the choice of the correct conductor. The economic viewpoint is not neglected and the reader has sufficient data to choose the most efficient service for each particular problem.—H. R.

Outline of Radio. Edited by E. Molloy. Pp. 688, figs. 503, index. George Newnes, Ltd., Tower House, Southampton Street, London, W.C.2. Price 21s.

This book, which has been written by a team of specialists, contains a clear and concise exposition of the fundamental principles upon which radio, television and radar depend. It starts with a simple explanation of the nature of matter and electrons, leading the reader by easy stages to an understanding of the latest types of radio and television receiving equipment.

The authors show how the necessary components of a radio circuit are designed to fulfil the theoretical requirements. A number of typical receiver circuits are set out and explained in detail so that the reader should be able to understand the circuit arrangement of any particular radio or television receiver that he may encounter.—R. P.

Books Received

Elements of Electronics. By G. Windred, A.M.I.E.E. Pp. 197; figs. 100 and six plates. Chapman & Hall, Ltd., 37, Essex Street, London, W.C.2. Price 15s.

A New Dynamometer

Principles of Design and Operation

By F. A. GARRETT, M.I.Mech.E.

THIS dynamometer, of the mechanical-hydraulic type, was designed during the war years to satisfy stringent conditions imposed for the testing of remote control apparatus for 3.7 A.A. guns. The specification of tests included torque and sensitivity to small fluctuations of load, coupled with instantaneous reversals in direction of rotation from maximum down to creeping speeds of less than one revolution per minute.

The first two dynamometers made (Fig. 1) were so successful that some thirty were subsequently supplied to various firms, research laboratories and Government Departments.

The objection to most friction type dynamometers is the serious lack of steadiness of the recording or indicating mechanisms, which is such as to make it almost, if not entirely, impossible to obtain accurate readings of the torque being transmitted. This unsteadiness comes about by reason of small variations in the coefficient of friction, coupled with, more often than not, a natural periodicity of the recording mechanism. My new design avoids these objections completely. As a matter of fact the absolute steadiness of the recording needle when the dynamometer is under load is remarkable, so much so that observers have on many occasions remarked that "the needle looks as if it is permanently fixed to the dial."

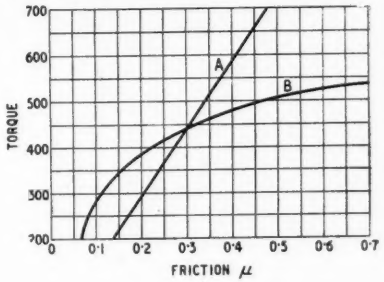


Fig. 2.—Torque-friction curves

A representative torque/friction curve (Fig. 2, curve "A") for a simple orthodox type of friction brake shows that when $u = 0.3$ the corresponding torque is 443. If u rises to 0.45 the torque rises to 665. In other words, torque is proportional to u. Now compare these figures with curve "B," a condition which is brought about with the new design of dynamometer; here, when $u = 0.3$, the torque $= 443$; when $u = 0.45$ the torque has only risen to 495. The comparative figures are purposely

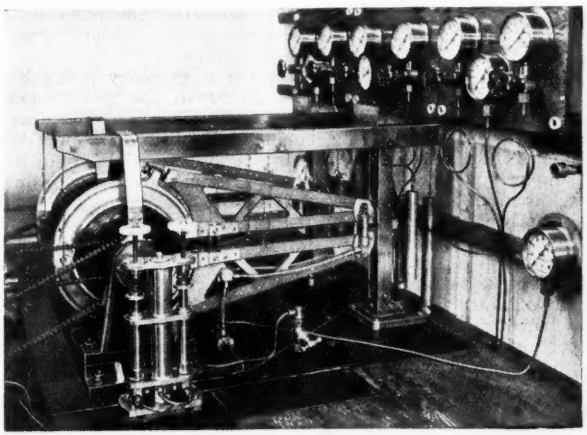


Fig. 1.—First two dynamometers fitted to test bench.

taken over a fairly wide range in order to illustrate the points now being discussed. It is, however, easy to see how small variations of u are damped out; any small variations which remain are easily taken care of by the damping effect of the hydraulic systems, to be described later.

The general layout (Fig. 3) comprises a water-cooled brake drum mounted on a shaft which runs in ball and roller bearings. Encircling the brake drum are two shoes flexibly coupled to torque arms, the outer ends of which are free to move upward or downward (depending on direction of rotation) between upper and lower pistons JT and JB.

The upper and lower torque arms are pivoted to upper and lower brake shoes respectively. An abutment is provided between each torque arm and shoe corresponding to T. Adjusting screws at these positions ensure clearance at one of these two points when the dynamometer is under load.

The upper and lower torque arms are coupled together by pivot pins at X and connecting bolts O. By reason of the fact that the outer ends of the torque arms can be pushed apart by creating a pressure in the two hydraulic loader cylinders E, the brake shoes are brought into contact with the drum, thereby setting up frictional effort of any desired amount. As this effort is built up, the brake shoes and torque arms move with the rotation of the drum, but are restrained by piston JT if clockwise and by piston JB if anti-clockwise.

Booster Unit

An important feature of the dynamometer is the booster unit (A in Fig. 3) mounted immediately above the brake drum and shoe assembly. This comprises a reservoir for supplying oil to two independent pressure circuits.

Mounted on each side of the reservoir there is a cylinder containing a piston, at the outer end of which is a coil spring B. This is interposed between the piston and a ball bearing thrust block attached to one end of the screwed spindle, which can be seen in the photograph. At the opposite end of the screwed spindle a micrometer adjuster F is provided. The spindle attached to the knob G passes right through the screwed spindle of the micrometer adjuster and is permanently fixed into the outer end of the piston.

The assembly just described is connected by suitable piping to loader cylinder E and pressure gauge D. On the opposite side of the oil reservoir there is a similar arrangement, embodying micrometer adjuster L and pump M. These, however, are piped up to cylinders JT and JB and torque gauge C, the dial of which is graduated in lb-in or lb-ft, whichever is more convenient.

Knobs G and M are used for quickly building up pipe-line pressures to the approximate amount required, after which F and L are used for final fine adjustment of load and corresponding torque.

An electrically operated pilot lamp is provided at K, which remains alight so long as the torque is properly balanced on one or other of the pistons J, T and J, B.

Action of Balance Weights

The remaining detail of importance is the balance weights to be seen at the extreme left-hand side of Fig. 3. One of them is coupled to the hinge pin of the brake shoes (right-hand of photograph), another is coupled at the centre of gravity of top torque arm, while the third is coupled at centre of gravity of lower torque arm. The balance thus established cancels out completely the weight of the various non-rotating torque members and ensures that the brake drum will run perfectly freely without friction under no-load conditions.

In operation it is generally preferable to couple directly to the power unit to be tested, but, if this is not convenient, then a chain or vee belt drive may be substituted. These alternatives are likely to introduce small unknown errors, due to the small degree of inefficiency of such drives.

For testing first start up the power unit, then build up a load on the dynamometer by operating pump knob G. While this is being done, operate pump knob M with the other hand, so that a rough balance is maintained between load and torque. It is quite easy to maintain this by observing the pilot light K. After the required conditions of test have been approximated in the manner described, spin the micrometer

adjusters F and L in a clockwise direction until they take up the hydraulic load from pumps G and M. Now make the necessary fine adjustments with F and L; with the pilot light indicating "load," read gauge C for torque and r.p.m. from tachometer (the latter is provided as a standard fitment on the latest design of dynamometers). From the above readings the horse power

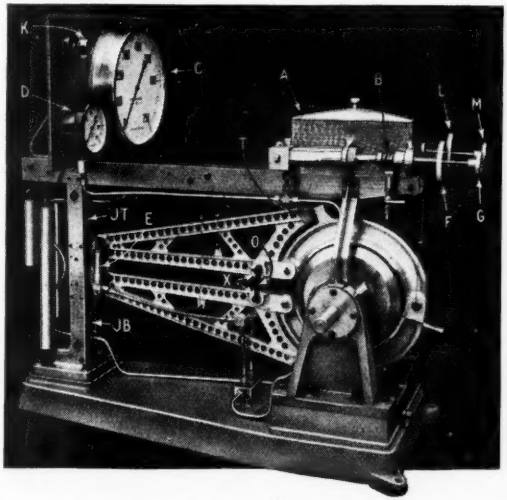


Fig. 3.—General layout of dynamometer assembly

given off may be readily calculated in the usual manner.

Once the settings have been made as described, the power unit under test may be reversed and, without any further adjustment being necessary, torque readings will again be indicated on gauge C.

The action of the dynamometer under the above testing conditions is as follows. Assuming anti-clock rotation (viewed as Fig. 3) and a frictioned load applied to loaders E, the brake shoes and torque arms rotate with the brake drum. After a small radial movement the brake shoe abutment screw T makes contact with the upper torque arm. The torque will therefore be transmitted through the last mentioned, through the oil medium in loader cylinder E to the lower arm, the extreme end of which is supported on the point of the lower piston JB.

When this has taken place there is a clearance between the lowef abutment screw (corresponding to T of top shoe) so that the lower arm becomes a simple lever pivoting about X. Under these conditions, the amount of friction between brake shoe linings and drum is determined by an operating force acting at the outer end of the lever, the amount depending on the difference between opposing pressures on pistons E and JB.

For example, if with a given setting for torque load the co-efficient of friction momentarily rises, piston JB will automatically cause a greater torque reaction. This modifies the effect of pistons E by reducing the available operating force at the outer end of the lower arm. By so doing the frictional effort is reduced. Should the co-efficient of friction fall momentarily the opposite of the above would take place. The effect of all this is to cancel out any waver, or snatch, resulting from causes mentioned earlier.

This explanation of the action with anti-clockwise rotation makes it clear that, if the direction of rotation is reversed, the lower arm of the machine becomes the torque member while the upper arm becomes the hinged friction-controlling member.

Regarding the capacities of these new dynamometers it may be mentioned that two are now under construction for dealing with torque loads from zero to 3,000 lb-in (250 lb-ft). Generally speaking there is little, if any, limit to the capacity which this type can deal with. They are particularly suitable for determining a full range of torque loads from extremely low speeds up to, say, 1,500 to 2,000 r.p.m. maximum.

The dynamometer is covered by British Patent No. 563534, the corresponding American patent being No. 2372420.

Arrangements are now being made for the manufacture and marketing of these machines on a commercial basis.

Switchgear Manufacture

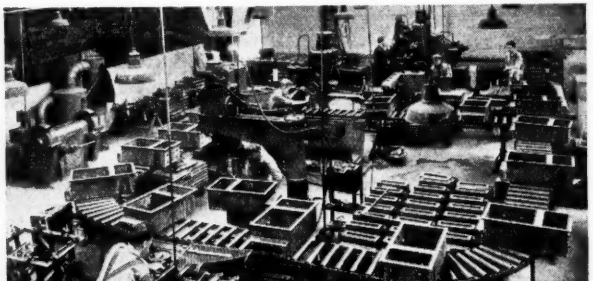
Scottish Company Celebrates its Thirtieth Anniversary

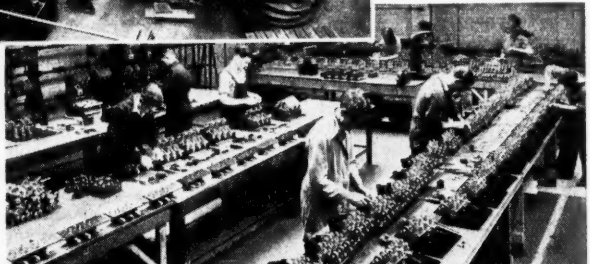
WHEN in Scotland last week we paid a visit to the two factories of the Belmos Co., Ltd., which are situated at Bellshill and Blantyre, just to the south of Glasgow. This company, which is at present celebrating its thirtieth anniversary, has until recently concentrated the whole of its production on flameproof air-break switch and control gear for use in coal mines. The equipment, which has been developed over the past twenty years, is made in many different forms, and although it is primarily of interest to the mining engineer, it has many applications in other industries where there are explosive or inflammable atmospheres.

A departure from this type of product takes the form of a range of non-flameproof switch and motor control gear for general industrial use. It is being built in a new factory on the Scottish Industrial Estate at Blantyre, leaving the original works at Bellshill free to continue with the production of mining gear.

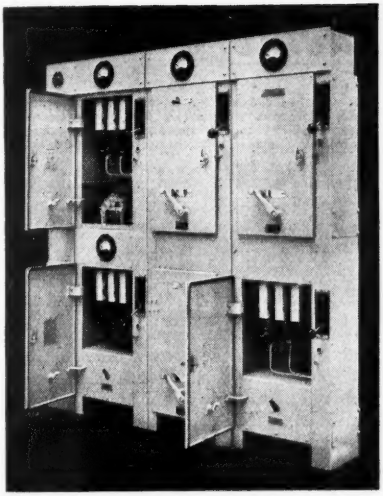
A feature of the non-flameproof units is that they incorporate the same contactors, circuit-breakers, isolating switches, etc., as are used in the flameproof design. Two forms of gear are made: a pillar type motor starting unit for any kind of induction motor and a switchboard type of either motor starter or circuit breaker. The latter may be used individually or arranged in single or double tiers as a multi-unit board.

During the last twenty years the Bellshill works has concentrated on air-break flameproof switchgear and has built up an extensive





Machining flameproof housings for mining equipment at Bellshill, and (right) Sub-assembly operations and coil winding at Bellshill



Typical double-tier six-panel circuit breaker switchboard for general industrial use

plant which has been designed with a view to large batch production of the equipment.

Two machine shops, one for the machining of fabricated steel cases and the other dealing with all small components, are capable of handling the varied and specialized work which is involved in flameproof design. In the heavy machine shop, for example, the machining of cover and case flanges has been given special attention to ensure accuracy of the gap in final assembly. Similarly, in the light machine shop, a battery of automatic lathes has been installed to produce screws and other parts.

The company was among the first to develop the technique of welded steel cases for flameproof switchgear and evidence of the degree to which this has been carried is obvious on inspecting the fabricating shop and the assembly bays.

Both the machine shops and the fabricating shop are well served by a small but efficient toolroom, the tooling of components being carried to considerable lengths to ensure accuracy and interchangeability of parts, the latter being essential in the mining industry where wear and tear is considerable.

Coil winding and sub-assemblies are concentrated in another shop and these lead to the final assembly where the completed flameproof apparatus is built and tested. The organization at Bellshill operates on modern lines of stock control and batch production, all designs being based on the principle of using common parts wherever possible.

The major electrical items used in the flameproof gear are a contactor, an air-circuit breaker and an isolating switch. These are in considerable demand in other industries where flameproof housings are not essential and it is to meet this demand that the company has recently leased the premises at Blantyre, covering some 30,000 sq ft, in which to build industrial switchboards incorporating both contactors and circuit breakers, in addition to motor starting pillars, works distribution pillars and similar types of equipment.

Industrial switchboard assembly at Blantyre

In these works a fabricating department has been established for the production of standardized sheet metal housings suitable for the product. The contactors, circuit-breakers and isolating switches are "imported" from Bellshill and are assembled at Blantyre in the switchboards or starters to suit customers' requirements.

Correspondence

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for the opinions expressed by correspondents

Wood-Pole Decay

AT a recent meeting of the Executive Committee of this Association the attention of members was drawn to correspondence (29th April, 20th May, 3rd June, 1st July) relating to failure of transmission line poles.

In one letter it was implied that failure was attributable to the inefficacy of creosote as a fungicide. The Executive Committee, representing all branches of the wood-preservation industry, repudiates such an implication. No preservative, at a minimum concentration lethal to the less resistant fungi, is uniformly toxic to all the species capable of causing decay in timber. Creosote at very low concentrations may not, therefore, be entirely effective against *Lentinus lepideus*, the species named, but impartial investigation of poles which have failed showed that in no instance could the incidence of decay be traced to any part of a pole in which impregnation had conformed to the usual specification. Failure was due either to inadequate seasoning before treatment with the preservative, or to otherwise imperfect treating technique resulting in the incomplete penetration of the sapwood.

Of the hundreds of species of fungi capable of causing rot, the above named species requires a higher concentration of creosote in the treated wood than most. Nevertheless, *Lentinus lepideus* does not attack timber which is adequately impregnated in accordance with the usual specifications for poles. The widespread use of creosote in comparison with most other preservatives is in itself a testimony to its general efficiency.

BRITISH WOOD PRESERVING ASSOCIATION,
H. A. COX, M.A.,
London, E.C.4. *Secretary.*

Overhead Lines in Lincolnshire

WE were surprised to read in your issue dated 26th August the item published under the head "Agreement on Power Lines" on page 404. The statements made concerning the meeting between representatives of the Yorkshire Electricity Board and the Lindsey County Planning Committee are not a fair report of the proceedings of this meeting.

At no time was it stated by representatives of the Yorkshire Electricity Board that "wherever possible extensions will be underground to avoid spoiling the scenic beauty of the area," nor, further, that "supply to the villages of Elsham, Worlsby and Ulceby should be by underground cable."

It was stated that the staff of the Board were always anxious to co-operate as far as possible in preserving the amenities of the countryside, and were always prepared to consider suggestions for the realignment of lines. Indeed, it was felt that where amenity values were high, the Board would be justified in incurring some degree of additional expenditure to preserve such amenities. Nevertheless, the Board's intention is to utilize overhead construction to the full, having regard always to the economic aspect as well as the expeditious carrying out of the programme.

E. H. GREGORY,
Public Relations Officer,
YORKSHIRE ELECTRICITY BOARD.
Leeds.

[We regret that the report, taken from a local newspaper, gave an incorrect view of the position.—Editors, *Electrical Review*.]

"A Dangerous Injunction"

THE injunction to cut short the earth wire if unwanted in the immersion heater obtained by Mr. Alex. Milne may not be as dangerous as would appear at first sight.

No doubt many of these heaters will be operated from two-pin outlets or lampholders, without facilities for earthing, and therefore in such cases, in my opinion, it is less dangerous to cut the earth wire short than to leave it as supplied and loose, with the possibility of its coming into contact with one of the line

terminals in the plug and rendering the casing of the heater alive.

The injunction does at least give specific instruction what to do with the unwanted lead, and may preclude its being connected along with one of the other leads to one of the plug terminals by an unskilled purchaser, an occurrence by no means unknown to the portable appliance industry.

S. F. PHILPOTT, M.I.E.E.

Ealing, W.13.

I AM strongly in favour of Mr. Milne's exposure of the sale of electrical appliances that do not offer full safety for the user.

It has always been my practice to ensure efficient earthing of all equipment that has passed through my hands, yet I have often been told that I am "too fussy," especially when I refuse to connect kettles, irons, hot plates, etc., to two-pin installations.

Another thing which I strongly deprecate is the increasing use of 13A anti-flash sockets in houses. The average housewife has a common habit of breaking connection by pulling the lead off an iron or kettle, which, even in an efficiently earthed installation, is dangerous should there be a fairly strong leakage to earth on the appliance in use. Surely it would not be too much to ask for regulations insisting on switch plugs or separate switches to replace the live socket and fused pin.

O. A. TOBIN.

Kenton, Middx.

British Transport Commission

FIRST ANNUAL REPORT AND ACCOUNTS

THE re-organization and progress made during the first year of the nationalization of the British transport undertakings are dealt with in detail in the first annual report and accounts of the British Transport Commission which have been published as a House of Commons paper this week.

The consolidated accounts show a net deficit of £4.7 million, after charging interest and capital redemption. The Commission states that although the actual revenue deficit before charges for capital redemption and special items is only £1.7 million, representing a small percentage of the gross traffic and other receipts, it does not regard the position as satisfactory. Economies are expected from the concentration of each form of transport, but recent trends of traffic receipts and of expenditure, notably wages, coal and steel, hold out no hope of early improvement.

A considerable part of the report covers the creation of the organization, the taking over and its immediate problems and the progress made towards the objectives of the Transport Act. It points out that no system of transport can be efficient unless it keeps pace with the developments of the industries which it serves, and unless it meets the standards of comfort and convenience which the public demands. Though for the present the emphasis must be placed on reconstruction and reconditioning, steps are being taken to frame a long-term policy for future development. Inquiries have begun in regard to standardization of rolling stock, to alternative forms of traction, and to the further provision and improvement of automatic train control, signalling and other safety devices on the railways.

Dealing with the London transport system, the report states that the trolleybus services were extended by 4 per cent to 3,021,000 miles, and the traffic receipts per car-mile increased by 0.5d to 26d. The gain in receipts, however, was more than offset by the heavier expenses. The tram services were continued but only at a serious financial loss, the cost per car-mile being 26.2d with traffic receipts of 18.7d. About half of the traffic receipts had to be spent on repairs to the system and the rolling stock. Authority had been given and plans were in hand to commence the substitution of buses for trams in the autumn of 1950. It was expected that the conversion would be completed in 1952.

The organization and operations of the Executives are dealt with in some detail.

Referring to the work in hand by the Railway Executive, the report states that estimates are being prepared for the change of frequency from 25 to 50 cycles in the area of the Southern Region and the reconstruction of Durnsford Road power station. Stonebridge Park power station in the London Midland Region was connected with the national grid by means of a 22 kV cable to the London Power Co.'s power station at Willesden and was brought into service for the first time in January, 1948. The change-over of the power supply of the Liverpool and Southport line to 50 cycles and the closing down of the Formby power station were nearing completion. In the Scottish Region work was begun on the provision of a bulk supply from the electricity authority to Queen Street Station and the North British Hotel, Edinburgh.

Reference is made to progress made in the Liverpool Street to Shenfield electrification (a service on which is scheduled to commence towards the end of the current month), and to the Manchester-Sheffield-Wath electrification the electrical equipment for the substations for which was on contract and the engineering work well in hand. Various modifications, improvements and new works in connection with stations, workshops, replacement of obsolescent equipment, etc., were begun, and in some cases completed in the Regions during the year. New electric rolling stock included a 1,470 h.p. mixed traffic locomotive, making three in the Southern Region, while the construction of 85 mixed locomotives for the Manchester-Sheffield-Wath electrification was proceeding.

"Underground" Extensions

New works and improvements on the London Underground System were the completion of two further stages in the eastern extension and the second and final stage in the western extension of the Central Line. Much of the work on this line referred to in the report has since been completed or is nearing completion. Work had been put in hand in connection with the extension of the Bakerloo Line to Camberwell, so that no time would be lost when authority was received to proceed with the work.

Powers were being sought by the Commission in the 1948-49 session of Parliament to carry out additional works, including four-tracking of the railway between North Ealing station and Acton North junction, the construction of a railway rolling stock depot at Ickenham, the replacement of the flat junction by a burrowing junction at Rayners Lane, the use of land at Stanmore for the construction of a railway rolling stock depot, and the extension and improvement of certain garages and other works. New railway rolling stock included the delivery in the early part of 1949 of 143 new surface line cars for the London Transport Executive, while authority was received for the purchase of a further 90 surface line cars and 89 tube cars, delivery of which was expected in 1950.

The consumption of electricity by British Railways for traction during 1948 totalled 728 million kWh, or 2.58 kWh per car mile, and by the London transport system 933 million kWh.

I.E.E. Southern Centre

A GOLF competition in aid of the Benevolent Fund of the Institution of Electrical Engineers is being held by the Southern Centre of the Institution on 22nd September at Stoneham Golf Club, Southampton. There will be an 18-hole medal competition under handicap, an 18-hole four ball better ball competition under handicap against bogey, and a putting competition. In addition to prizes for all competitions a challenge cup presented by Pirelli-General Cable Works, Ltd., held for one year, will be awarded to the I.E.E. member returning the best score in the medal competition. There will be luncheon and high tea. The cost for the day will vary from 9s 6d to 28s according to the number of competitions and optional sweeps entered for and whether lunch and high tea are required. Applications for entry forms, which must be returned by 14th September, should be made to Mr. W. P. Conly, local hon. treasurer, I.E.E. Benevolent Fund, 5, Shanklin Road, Southampton (Telephone: Southampton 71662).

Trolley-bus Profit

Derby Corporation Omnibus Department turned a £16,000 deficit into a £10,000 surplus during the year ended 31st March, 1949. Trolley-buses made a profit of £12,295, whilst motor buses lost £2,593.

Personal and Social

NEWS OF MEN AND WOMEN OF THE INDUSTRY

THE Simplex Electric Co., Ltd., announces the appointment of **Mr. J. W. Rand** (senior representative of the Glasgow branch) as manager of its Edinburgh branch, with effect from 1st September. This appointment fills the vacancy caused by the death of Mr. F. Nash.

Miss Marjorie J. Gordon, B.Sc., M.A., head of the Physics Department at the Ladies' College, Cheltenham, sailed for New York on the *Queen Mary* on 7th September. She is the first teacher to be awarded a travelling exhibition by the Caroline Haslett Trust.

On 8th September, **Miss Elizabeth Gwillim** left Harwich to study domestic electrification in Holland, particularly in the rural areas. She is the fourth electrical housecraft adviser sent on an overseas study tour by the Caroline Haslett Trust. Miss Gwillim will spend two months abroad.

Mr. S. N. Watkins (Stanley N. Watkins, Ltd.) has been elected a vice-president of the Electrical Contractors' Association. He succeeds Mr. R. A. Parsons (Gloucester) who has completed his term as vice-president.

Mr. P. J. Humphrey, district engineer at Consett (Co. Durham) for the North Eastern Electricity Board, has retired after nearly forty years with the electricity undertaking. **Mr. W. Hodgson,** of Alnwick, has succeeded Mr. Humphrey at Consett.

Mr. C. Hughes has resigned from the board of the Kalgoorlie Electric Power & Lighting Corporation, Ltd.

Lord Latham, chairman of the London Transport Executive, accompanied by **Mr. A. B. B. Valentine,** member of the Executive, and **Mr. E. C. Ottaway,** works manager (buses and coaches), left England this week on the *Empress of France* on a five weeks' tour of Canada and the United States. They are to study current transatlantic practices in industrial and transport organization and managerial technique in order to keep abreast with modern trends.

Mr. R. H. Gummer, M.I.Mar.E., F.Inst.F., a director of International Combustion, Ltd., is leaving for South Africa on 15th September in the *Edinburgh Castle*. During his tour Mr. Gummer will be concerned with the progress of the company's contracts in the Union, as well as local manufacturing activities in Johannesburg and Durban. He will also participate in the activities of International Combustion Africa, Ltd., in the launching of its new foundries and engineering shops at Port Elizabeth. His address in South Africa will be Lopulco House, Cor. Simmonds and Webber Streets, Selby, Johannesburg.

Sir Harold Hartley, who has been chairman of the British National Committee and International Executive Council of the World Power Conference since 1935, has been elected president of the British Association for 1950.

Mr. J. R. Catchpole has been appointed general sales manager of William Steward & Co., Ltd. Mr. Catchpole served his apprenticeship with the company and until recently was in charge of the Motor Rewinding & Service Department, which position has now been taken over by **Mr. I. E. Terry,** who also served his apprenticeship with the company.

Dame Caroline Haslett, who is the British vice-president of the International Federation of Business and Professional Women, will be one of the hostesses during the fifth Congress of the Federation which is being held in London at the beginning of August next year.

In the Merseyside and North Wales Area golf competition of the **Electrical Industries Benevolent Association,** recently played at Heswall, the four best returns were made by Messrs. L. W. Bryan (net 66), W. Rothery (68), F. Rawlinson (68) and R. S. Owen, who tied with A. McDowall (70). Mr. Owen qualified on the first nine holes. The four players will now qualify for the national final at Moor Park, London, on 3rd October.

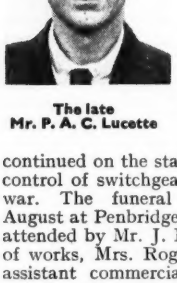
In perfect weather and the beautiful setting of the Burford Lodge sports ground, the **Surrey Electricity Sports and Social Association** held a flower show and garden party on Saturday last. The occasion was attended by Mr. C. G. Morley New, member of the South Eastern Electricity Board, and Mr. A. L. Burnell, the Board's secretary. The flower show, which was opened by Mrs. Laurence Bird, wife of the chairman of the Box Hill Management Commit-

tee of the National Trust, included displays of vegetables grown by the staff and examples of handicraft. The programme included miniature cricket matches, gymnastic displays, tugs-of-war and hair-raising feats on motor cycles by officers and men of the Royal Signals. The prizes were presented by Mrs. S. Gill.

Obituary

Mr. Charles A. Newton, governing director of C. A. Newton & Co., Ltd., Derby, died on 27th August, at the age of seventy-two. Mr. Newton received his technical training at West of Scotland Technical College, and founded Newton Bros. (Derby), Ltd., in 1899, being chairman of the company for many years. He was also founder and first chairman of Derby Cables, Ltd (1928-34), and remained chairman for one year after the company was purchased by Crompton Parkinson, Ltd. Mr. Newton was also chairman and founder member of Rayophone, Ltd. He was an associate member of the Institution of Electrical Engineers.

Mr. P. A. C. Lucette.—The death occurred on 25th August, while on holiday at Teignmouth, Devon of Mr. P. A. C. Lucette, B.Sc., A.M.I.E.E. switchgear contracts manager at the Stafford Works of the English Electric Co., Ltd. Mr. Lucette, who was forty-five years of age, joined the English Electric Co. at Stafford as a student apprentice in 1927. He completed his apprenticeship in the Switchgear Sales Section, in which he continued on the staff until he took over the control of switchgear contracts early in the war. The funeral took place on 29th August at Penbridge, near Stafford, and was attended by Mr. J. Rogers, general manager of works, Mrs. Rogers, Mr. R. J. Sanders, assistant commercial manager, and many representatives of the switchgear and other sections of the English Electric Co.



The late Mr. P. A. C. Lucette

Mr. R. S. Whaley.—The death is announced of Mr. Ralph Stanley Whaley, M.I.Mech.E., M.I.E.E., which occurred on 4th September at his home in Sutton Coldfield. Mr. Whaley was chairman and managing director of Speedy & Eynon, Ltd., the British Electric Co. (Beco), Ltd., and Engineering Services, Ltd. He was at one time contracts manager with Crompton Parkinson, Ltd.

Mr. M. Goodfellow.—The death occurred on 31st August, in his sixty-second year, of Mr. Magnus Goodfellow, chairman and managing director of the Ever Ready Co. (Gt. Britain), Ltd. Mr. Goodfellow, who was a pioneer of the dry battery business in this country, joined the Ever Ready Co. as secretary in 1912, and was appointed a director in 1913. He was appointed deputy chairman and managing director on the formation of the new company, Ever Ready Co. (Gt. Britain), Ltd., in 1920, and was elected chairman in 1928. Under his guidance, the company grew from 500 employees in 1920 to 10,000 at the present time, while the net assets increased from £384,000 to £1,240,000.

The late Mr. Magnus Goodfellow

Mr. and Mrs. W. W. Smith.—The death occurred recently as a result of a motoring accident in Cumberland of Mr. W. W. Smith, head of Smith & Co., registered installation contractors, Carlisle, and his wife. Mr. Smith was a member of the Council of the Association of Electrical Machinery Traders and claimed to have been the first in the Border Country to establish an electric motor repair shop.

Wills

Mr. L. R. Farrell, A.M.I.E.E., manager of the Bristol district sub-office of the British Thomson-Houston Co., Ltd., who died on 15th May last, left £13,392 gross (£13,255 net).

Mr. E. P. Paxman, M.A., J.P., M.I. Mech.E., M.I.Mar. E., managing director of Davey Paxman & Co., Ltd., and a director of Ruston & Hornsby, Ltd., who died on 25th March last, left £40,348 gross (£23,934 net).

Mr. L. Tweedale, a director of Whipp & Bourne, Ltd., who died on 24th May, left £197,896 gross (£191,267 net).

Mr. M. Porn, managing director of the Pan Electric, Ltd., and Porn & Dunwoody, Ltd., diesel engineers, who died on 21st April last, left £56,714 (£39,345 net).

Mr. E. A. N. Pochin, M.B.E., of Chelmsford, retired electrical engineer (formerly with Crompton & Co.), who died on 30th April last, left £60,842 gross (£60,730 net).

Mr. F. H. Kingsnorth, chief sales accountant to the General Electric Co., Ltd., who died on 26th April last, left £8,717 gross (£6,223 net).

Commerce and Industry

Electrical Contracting in the South-West

OFFICIALS of the Electrical Trades Union recently interviewed Mr. S. F. Steward, chairman of the South-Western Electricity Board, on the future of the Board's electrical contracting departments. The *Electrical Trades Journal* reports that the officials "were assured that it was the intention of the Board in all places where there were already contracting departments to expand them, that certain restrictions had been lifted and things should generally become easier in this direction." Mr. Steward further told the delegation that it was not the policy of the Board to open new contracting departments where it was considered that the consumer was already well served by the private contractor.

The matter apparently arose from the discharge of members of the Union on account of their redundancy because of lack of work for the contracting departments of the Board.

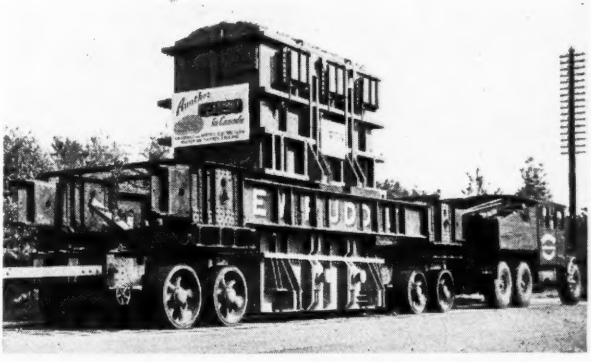
Industrial Finishes Exhibition

The importance of first-rate industrial finishing if Britain is to maintain and increase her overseas markets was stressed at a meeting of Birmingham industrialists, held at the Queen's Hotel, Birmingham, on 5th September. Sir Patrick Hannon, M.P., presided, and was accompanied by the Lord Mayor of Birmingham (Alderman Hubert Humphreys, J.P.). Among the representatives of forty Birmingham firms were Mr. W. Higgs, immediate past president of the Birmingham Chamber of Commerce and chairman of Higgs Motors, Ltd., and Mr. W. E. Wright, managing director of the Pyrene Co.

It was explained that, while the idea of an Industrial Finishes Exhibition was new to Britain, the United States of America was this year holding its thirty-sixth annual Industrial Finishes Exhibition. The subject had compelled increasing attention because of the many complaints which had been received from buyers overseas of the inferior and even shoddy finish of British manufactured goods of all kinds. It was not sufficient that industrialists in Birmingham, or elsewhere, should produce a full range of first-rate finishes; steps must be taken to make British manufacturers aware of the facilities and materials. For this reason it had been decided to proceed with the holding of the first Industrial Finishes Exhibition at Earl's Court, London, from 23rd August to 5th September, 1950. A considerable proportion of the space has already been reserved. Inquiries should be addressed to the Exhibition Offices, 26, Old Brompton Road, London, S.W.7 (telephone: Kensington 0025).

Transformer Shipment

With the dollar crisis as front page news, special interest attaches to the shipment by the Hackbridge and Hewittic Electric Co. of the first of two 60,000 kVA transformers to Canada, for service on the Shawinigan system at Shawinigan Falls, Quebec.



A large Hackbridge transformer ready for shipment to Canada

These are three-phase type OFW units with a voltage ratio of 125 kV star/66 kV delta, having push-button controlled on-load tap changing equipment on the 125 kV winding to provide a voltage variation of

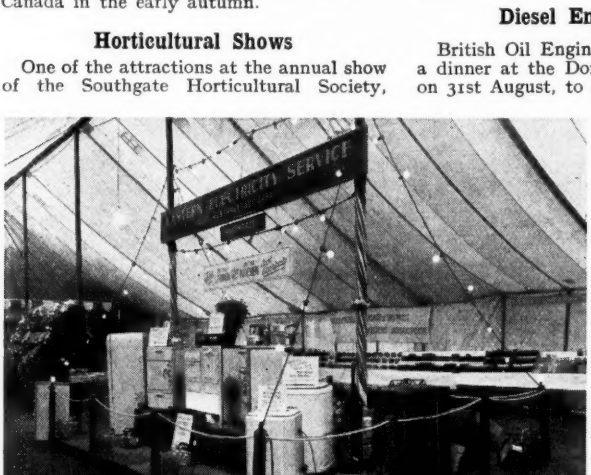
plus and minus 12 per cent in 20 steps. Cooling is by means of Serck water-cooled oil coolers with submerged type motor driven pumps to provide forced oil circulation.

The transformers will be used as interconnectors between the 66 and 110 kV systems at Shawinigan Falls, to permit the transfer of generating capacity from the Montreal system to the 66 kV system. Concurrently with their manufacture, generating capacity at Shawinigan Falls has been increased by the installation of three new generators each of 65,000 h.p.

Each transformer weighs 111 long tons complete and 69 long tons stripped for shipment. Weight was an important determining factor in their design, having to be kept within limits imposed by the crane facilities available in the course of shipment to site. For this reason, these units are of three-limb core construction in contrast to the lower height five-limb core design commonly adopted for Hackbridge transformers of this size; the height of the transformers is about 26ft overall. The second 60,000 kVA transformer is now in the final stages of manufacture and is expected to be shipped to Canada in the early autumn.

Horticultural Shows

One of the attractions at the annual show of the Southgate Horticultural Society, which was held at Broomfield Park, N.13, on 26th and 27th August, was the display arranged by the Eastern Electricity Board. This was housed in a large marquee and was divided into two main sections, one showing horticultural exhibits, including the E.D.A. horticultural model exhibits (greenhouse, cold frame, etc.), with the electrical equipment clearly shown, lawn mower, hedge clipper, and electric forcing frame, and the other domestic electrical apparatus, including cookers, refrigerators, washing machines, etc. There was also a display of bottled fruit, and leaflets on fruit bottling were distributed. The stand was awarded a silver medal.



The Eastern Electricity Board's domestic display at Southgate

At the Eastbourne Flower Show held recently at the Winter Garden and attended by over 8,000 people on the two days, the stand of the S.E. Electricity Board Eastbourne District broke with tradition since it dealt exclusively with horticultural subjects and was intended to introduce the gardener to the Board's services in this connection. E.D.A. models of horticultural applications, together with samples of actual equipment illustrated the subject in a popular way and paper sculpture was used to good effect. A R.H.S. bronze medal was awarded the exhibit which was carried out by the Board's Display Department.

Diesel Engine Exports

British Oil Engines (Export), Ltd., gave a dinner at the Dorchester Hotel, London, on 31st August, to a number of their overseas agents and friends who were visiting the country for the Engineering and Marine Exhibition at Olympia. Mr. A. G. Bottomley, Secretary for Overseas Trade, was the chief guest and altogether representatives from over thirty countries were present. Proposing the toast "British Export Trade," Mr. Alan P. Good, chairman of the company, referred to the tremendous increase over the last ten years in the exports of diesel engines by the industry as a whole, and to the outstanding part which the company had played in this achievement. The 1939 exports of the whole diesel engine industry were £2,776,000. The three companies which now make up British Oil Engines (Export), Ltd. (Mirrlees, Bickerton & Day; J. & H.

McLaren; and Peters of Staines), exported in that year £426,000. Exports in 1948 totalled £16,761,000, and their company was exporting in 1949 at the annual rate of £7,750,000. That was 45 per cent of the figure reached by the whole British industry during 1948. The order book of the Brush-Boex organization has remained virtually unchanged during the last eight months at just over £20,000,000.

E.D.A. Southport Conference

The North Western-Merseyside and North Wales Area of the British Electrical Development Association is holding an autumn conference at the electricity supply showrooms, 188, Lord Street, Southport, on 6th and 7th October next.

A civic welcome will be given to delegates by the Mayor of Southport, and the subjects for the first day will be "Farm Electrification Problems," including a discussion on recently introduced equipment, the speakers being Messrs. J. A. Duncan and C. A. Cameron Brown, and "The Application of Electricity in Schools, including Lighting, Heating and Cooking," by Mr. E. M. Ackery.

On the second day of the Conference Mr. W. Gilchrist will speak on "Salesmanship and the Future," and after lunch Mr. N. H. Bridge will talk on "Publicity and its Association with the Winter Demand." On each evening new E.D.A. films will be shown.

E.A.W. Housecraft Examinations

The twenty-fifth certificate examination in electrical housecraft for demonstrators and saleswomen arranged by the Electrical Association for Women was held on 23rd June, when seventy candidates qualified for the certificate. Examinations were conducted at the domestic science colleges at Bristol, Glasgow and Leeds; at the technical colleges at Birmingham, Bournemouth, Lewisham, Salford and Sheffield; and at the Polytechnics at Chelsea and Holloway. The total number of certificate holders is now 1,505.

The Association's certificate examination in electrical housecraft for teachers was held on 25th June, when 28 candidates qualified for the certificate. Examinations were conducted at the Yorkshire Electricity Board, Leeds, the North Eastern Electricity Board, Sunderland, the domestic science colleges at Edinburgh and Glasgow, and at the E.A.W. headquarters. We are informed that the total number of certificate holders is now 1,460.

Mural Paintings for Showrooms

In our issue of 12th August we mentioned that work had commenced on mural paintings on two bricked-in window spaces at the headquarters of the South Western Electricity Board, Bristol. The designs, which consist of two maps of the South Western area, were completed in a fortnight by four students of the West of England College of Art and one of the designs is shown in the accompanying picture.

One of the mural paintings at Electricity House, Bristol

Murphy Radio Acquisition

Murphy Radio, Ltd., announces an increase in its capital of 300,000 5 per cent £1 cum. preference shares for the acquisition of two interests in the electro-medical field, General Radiological, Ltd., and Solus-Schall, Ltd. General Radiological and Solus-Schall will continue to operate as before, each of these organizations specializing in production of its own particular equipments.

Retailers and Boards' Sales

A protest was recently made by the National Union of Small Shopkeepers to the Ministry of Fuel and Power at the decision of the South-East Scotland Electricity Board to sell electrical appliances. In its reply the Ministry pointed out that this was the practice of electricity supply undertakings before nationalization and that it was expressly provided for in the 1947 Electricity Act. The Ministry further said:

"The Act provides that in the accounts of the Boards, which must be presented to Parliament, each main activity shall be shown separately, so that there is no question of the retail side benefiting from a concealed subsidy derived from the sale of current."

British Meters for the Near East

Among many orders received by Measurement, Ltd., for electricity meters for export

A consignment of meters leaving the factory of Measurement, Ltd., for the Near East

is a large order for the Near East. In the accompanying illustration we show a consignment of 4,000 meters, which forms part of this order, leaving the company's Tarneside factory at Dobcross, near Oldham.

Mica Directorate

The Mica Directorate has removed to Empire House, St. Martins-le-Grand, London, E.C.1 (telephone: Clerkenwell 7931).

Caerphilly Installation Contract

Acceptance by Caerphilly U.D.C. of a tender submitted by the South Wales Electricity Board against the Council surveyor's recommendation of a lower tender by a private firm was discussed at a meeting of the Housing Committee last week. The tender was in respect of electrical installations at a Nantgarw housing site, and the clerk read a letter from the Welsh Board of Health asking if the decision was in accordance with standing orders, and what were the circumstances. It was pointed out that the criticism was not from the Board of Health but from an outside source. Mr. D. P. Thomas, chairman, said that the decision was by a majority vote of the Council, who considered that the Electricity Board employed local people. The difference between the two tenders was stated to be in the region of £300.

"Fair Competition"

A printer's error in last week's leaderette with the above title made nonsense of the last sentence. This should have read:—"He [Mr. Penwill] says that they [E.C.A. members] have for many years co-operated with the electricity supply industry to secure the maximum development in the use of electricity and it is hoped that the principles of fair competition now established will secure a continuance of this co-operation and so ensure adequate and efficient service to the public."

Regent Street Polytechnic

Evening classes in electrical engineering, including telecommunications, begin at the Polytechnic, Regent Street, London, W.1, on 26th September. The prospectus giving information on courses, fees and enrolment dates can be obtained on application to the Polytechnic.

Public Lighting Conference

The annual conference of the Association of Public Lighting Engineers opens on Monday next at Llandudno and will conclude on Friday.

Electricity Supply Workers' Wages

The agreement relating to wages and working conditions as at 20th July, 1949, of manual workers in the service of the Electricity Boards and the agreement relating to the negotiating machinery dated 31st March, 1948, have now been published as a 64-page booklet. Copies (price 3d each) can be obtained from the Electricity Boards' or trade unions' secretaries of the appropriate District Joint Industrial Councils for the Electricity Supply Industry.

Wiring on the Brabazon

About two-thirds of all the electrical wiring in the Bristol Brabazon aircraft, which made its first flight on 4th September, is carried out with Pirelli-General civil aircraft cables. A large quantity of cabling is involved on account of the many items of test and recording equipment installed in this 130-ton machine for amassing data during flight. The cables are insulated with

rubber or p.v.c., and have a glass-braided outer covering which effects a considerable saving in weight compared with the use of cotton. A safeguard to the handling of the Brabazon in the air is provided by the use of G.E.C. heavy alloy balance weights in the aileron system, the effect being to prevent inadvertent movements of the controls that might endanger the aircraft. Each weight weighs 7½ lb, but measures only 6in by 2in by 1in, and the six together provide a total weight of 45 lb in a remarkably small space.

Wages in the Contracting Industry

It is stated in the August issue of the *Electrical Trades Journal*, the official organ of the Electrical Trades Union, that an application has been made to the National Federated Electrical Association and the Electrical Contractors' Association of Scotland for a substantial increase in the wages of the Union's members in the electrical contracting industry.

Trade Announcements

G. S. Peckham & Co., Ltd., announce that they are now open on Saturday mornings (from 9 a.m. to noon) to deal with urgent requirements.

A new depot will shortly be opened by **Aerialite, Ltd.,** at 44-45, Suffolk Street, Birmingham.

Wolf Electric Tools, Ltd., announces the opening of a new service branch at 203B, Cheltenham Road, Bristol, 6. Telephone: Bristol 44418.

Plant for Victoria

The Victorian Government has approved the purchase of plant and equipment worth £A7,750,000 (£6,200,000 sterling) from Great Britain and Germany for a new briquette project at Morwell, announced Mr. W. S. Kent-Hughes, Minister for Electrical Undertakings, last week. Orders have been placed with the Mitchell Engineering Co. for boiler plant for two briquette factories, and with the Metropolitan-Vickers Electrical Co. for three 3,000 kW generators. The cost of the boiler plant delivered in Melbourne will be £A2,850,000 (£2,280,000 sterling) and the total landed cost of the generators £A773,000 (£618,400 sterling).—*Reuter* (Melbourne).

Courses on Coal

In conjunction with the Coal Industry Society, the Sir John Cass Technical Institute, Jewry Street, Aldgate, London, E.C.3, is again arranging courses of lectures on domestic and industrial fuel. The first year course is on Tuesday evenings from 18th October to 7th March and the second year course on Wednesday evenings from 19th October to 29th. Each course ends with a Coal Industry Society examination. The courses will be opened on 11th October with a public lecture by Sir Charles Ellis, F.R.S., on "Values of Coals from the Technical Standpoint." The ground covered by the courses includes preparation of coal, combustion, carbonization and gasification, measurements, appliances, sampling, heat transfer, boiler construction, boiler house instruments, etc. The fee for each course is 25s.

British Television in Milan

At the International Television Exhibition which opens in Milan on 10th September,

Marconi television equipment for the Milan Exhibition

British television equipment will be well represented. In the accompanying picture we show Marconi portable television equipmet being loaded on to a transport plane at Blackbushe Airport to be flown to the Exhibition.

Northern Ireland Strike Postponed

The strike decided on by Northern Ireland electricity workers has been postponed pending the consideration of their application for 1½d per hour increase in wages by a tribunal which will probably hold its first sitting on 10th September. Mr. Justice Sheil will be chairman.

British Association

DISCUSSIONS AND FURTHER PAPERS

THE general discussion on the first two papers presented to Section G (Engineering) at the Newcastle meeting of the British Association for the Advancement of Science, as reported last week, was opened by Dr. W. G. Radley (Deputy Engineer-in-Chief, G.P.O. Research Station), who said that while it had become almost a cliché among telecommunication engineers that future progress was becoming increasingly dependent on the use of new materials, that was not entirely true as many of the greatest forward steps had little to do with materials (for example, the thermionic valve and the cathode-ray tube), but the full application of a new technique had often had to await the development of an appropriate material.

Ferromagnetic Materials

In the telecommunication field much contemporary research on ferromagnetic materials was concerned with their use at frequencies extending up to 20,000 or 30,000 Mc/s. The need for materials having a specified combination of permittivity and permeability, together with certain restrictions on conductivity, arose during the war in the search for radio-wave absorbing coatings for radar camouflage. They had, however, numerous and valuable potentialities in civil applications, including the improvement of blind aircraft landing systems by eliminating disturbing reflections, reflectionless terminations of lines and wave guides, etc. A magnetic material satisfying these requirements should be a non-conductor in order to eliminate eddy-current losses which, at the frequencies in question, would be excessive. There had been considerable interest in the new "ferrites," which were non-metals (oxides) of specific resistance varying from 10^{-2} to 10^{+7} ohm-cm. Their study started in 1933 and was continued intensively in the Netherlands during the five years of German occupation.

It had recently been discovered that mixed ferrites had much higher permeability at ordinary temperatures than the pure ferrites; although zinc ferrite was, itself, not ferromagnetic, its addition lowered the Curie temperature; so that although 100 was a fair permeability for a pure manganese ferrite, 1,000 was not unusual for a mixed manganese-zinc ferrite, and higher figures could be obtained. The attendant disadvantage was that performance became very temperature-dependent and air gaps had to be introduced into the magnetic circuit to stabilize the performance when this material was used for the cores of conventional inductors. This had the incidental advantage of leading to a pot-type of design for the core, which facilitated production by avoiding the necessity for toroidal winding machines and, at the same time, ensured good screening between inductors.

The use of crystal triodes in place of thermionic valves was likely to be restricted because of (1) low input impedance and high output impedance, which made them unsuitable for insertion in normal circuits; (2) high internal noise (at present about 10 db above valve noise); (3) relatively low stage gain compared with the valve; and (4) limitation of maximum operating frequency.

The materials of greatest use to the telecommunications industry to-day were produced initially without any particular regard for the requirements of that industry. The outstanding requirements to-day, however, were better known and a not inconsiderable amount of helpful basic research on such problems as the relationship between molecular structure and specific dielectric, or magnetic, properties, was being sponsored on a national scale by the Department of Scientific and Industrial Research. But when those theoretical problems had been elucidated there remained the effect of the conditions of synthesis on the properties.

Semi-conducting Ceramic Glazes

Dr. J. S. Forrest (British Electricity Authority) said that one class of materials which had considerable significance in electrical engineering was the semi-con-

ducting ceramic glazes. They behaved like the true electronic semi-conductors mentioned by Dr. Sillars, but differed in that the semi-conducting metallic oxides were incorporated in an insulating glassy matrix.

Production was a difficult ceramic problem, however, so that all the manufacturing processes, in particular the firing, must be controlled to a much higher degree of precision than was necessary for ordinary electrical porcelain. An English porcelain manufacturer had been successful in producing various types of high voltage porcelain insulators with semi-conducting glazes, and the improvement in performance outdoors in humid and polluted atmospheres was quite remarkable.

Insulators on 275 kV Line

An illustration was shown of a semi-conducting glazed insulator having a resistance of 100 megohms and it was stated that four of them would be used in series on the experimental 275 kV line which was now being erected.

High voltage silicon carbide lightning arrestors consisted of sections in series and it was necessary that the applied voltage should be equally shared between the sections, and that the time lag of the spark gaps should be as small as possible. These requirements could be achieved by coating the porcelain containers with a semi-conducting glaze. A photograph was shown of a 132 kV arrestor of this type which was being tested outdoors at the British Electricity Authority's testing station at Croydon.

A number of 132 kV cable sealing ends with semi-conducting glaze on the outside surface of the porcelain were in service on the grid system. Semi-conducting glazes had also been proposed for controlling voltage distribution on high voltage air-blast switchgear and in high voltage d.c. generators.

Semi-conducting glazes had a high negative temperature coefficient, which could be utilized for the measurement of temperature. Small glazed porcelain elements of 1/10th in diameter and less than ½in long had been made for this purpose.

Deterioration of the glaze in the vicinity of the metal electrodes which made contact with the glaze could be reduced by the use of higher conductivity glaze at these places and by silvering the glaze at the contacts. Recent work had demonstrated that the deterioration was very much reduced if the insulator was under oil.

Coal-face Lighting

At the third meeting of the first day Dr. H. Cotton presented a paper on "Mains Lighting at the Coal Face." He said that the filament lamps at present available did not possess a sufficient margin of safety for a mains-operated system. It should not be impossible, however, to devise a lamp which would be safe in operation.

The fluorescent lamp had the disadvantage of mechanical weakness, since the lamp was an extended tubular source. Already it was reported that breakages at the coal face were very serious and, moreover, an explosion could take place if the tube was broken. From the point of view of the possibility of an ignition by the lamp itself, it was better to use cold starting and running.

The system of coal face lighting introduced by the National Coal Board and at present in operation in a number of collieries was a constant voltage system operated at 120 V. To secure portability they employed a number of units, each consisting of a lamp with lengths of cable attached, each cable-end terminating in a half coupler, In each unit there were two half couplers and two cable glands. At the coal face, all the units were connected by plugging together male and female half couplers, all in series. When the system was moved forward to a new position it was inevitable that, when carrying the lamps, the attached cable would drag along the ground, with detriment to both mechanical and electrical efficiency. When a fluorescent lamp was directly connected to the supply cable, the voltage impulse at starting and re-starting was applied directly to the cable and the couplers. The latter were designed for 120 V, but the impulse was about 1,000 V with preheating of the electrodes and greater than this with cold starting. Experience had shown that there was a possibility of breakdown with such a device.

Dr. Cotton explained a method he had devised to overcome these objections on the series system with the main single-core cable doubled back on itself and

plugged into a transformer. By earthing the middle point of the transformer secondary, the voltage above earth could exceed one-half of the total secondary. In order that the lighting unit might be entirely free of the cable, which was a great advantage, the lamp (whether filament or fluorescent) was fed from the secondary of a second small transformer, the primary of which was the looped main cable. To this end, the lamp transformer was made with a detachable yoke. By departing from true constant current working, operational advantages and reduction of transformer size, could be secured.

Experimental lamps had been made in three forms: (a) 25-W 25-V filament, (b) one 2ft fluorescent, and (c) a fitting with two 2ft fluorescent lamps. Assuming an average spacing of 10 yards, reasonable in view of the flexibility of the system, a 150-yard face would require 15 units. The system could be used with the safest possible fluorescent lamp (cold-starting) thereby giving a combination which, it was claimed, was greatly superior from the point of view of safety. In view of the expense, both initial and maintenance, of coal-face systems using fluorescent lamps, the author was of the opinion that the best solution to the problem lay in the development of a safe metal-filament lamp.

The author demonstrated the operation of his system and showed how a short circuit could take place without damage, which he contrasted with what might happen on the N.C.B. system.

During the discussion questions were put to Dr. Cotton by way of elucidating the details and claimed advantages of his system. He contended it should be cheaper than the older system because of its greater simplicity. A great deal depended on the amount of iron in the transformer and he saw the possibility of reducing the amount now used. What mattered was lumen-hours per shift and on that basis he did not think efficiency should be regarded from a too-academic point of view. The main object should be to improve the miner's environment and that involved adequate illumination irrespective of cost, within limits, of course.

Applying Scientific Knowledge

The presidential address to the Engineering Section was delivered on the fifth morning by Sir Arthur P. M. Fleming (Metropolitan-Vickers) who spoke of bridging the gap between science and industry. He explained the several stages involved in turning new scientific knowledge to industrial account.

While in Britain there was an increasing tendency towards co-operation in industrial research, there was not the same evidence of co-operation in the United States. The need to reduce the time lag at every step between the discovery of a new idea and its ultimate conversion into a usable product could not be overestimated. The value of time in making a new idea marketable seemed to be much more acutely realized in the U.S. than here. The reaction in normal times of the American industrialist in this respect was not far short of that obtaining under the stress of war.

The address concluded with brief remarks on how differently practical engineering training was viewed in the two countries. In the U.S. large numbers of scientists were gaining experience in the practical applications of nuclear physics. They would be able to turn to industrial account new discoveries made in that sphere. It would be the shortage of adequately experienced men that would most likely delay corresponding progress in Britain.

Electronics in War and Peace

The address was discussed and was followed in the afternoon by a paper by Dr. A. L. Whiteley (manager, Electronics Engineering Dept., B.T.H. Co.) in which he reviewed the peacetime status of his subject by comparison with its importance during the war. His object was to inquire whether the peacetime commercial activities of industry were making, or able to make, use of the rapid developments in electronics which had occurred since 1939.

Summarizing the advantages of electronics as a weapon of war, he said that if two combatant nations were equally equipped except that one was fully provided with modern electronic weapons and the other without, then the issue would hardly be in doubt. Similarly an industrial country using the present day level of electronics in manufacturing, transport and industry generally would have a markedly superior economy as compared with countries not so equipped.

Nevertheless, while electronic engineering was making an increasing contribution, a critical survey at the present time led to the conclusion that many reports and prophecies made from time to time were, in the main, too optimistic and sometimes extravagant. While the benefits of electronics were positive, they were sometimes marginal. Further, optimum results might depend upon the redesign of the controlled processes or machine. Thus the initial capital cost might be greatly in excess of the basic cost of an added electronic control system.

Procurement and training of operating and maintenance personnel was an equally serious matter. This and the other restrictions enumerated were not peculiar to this country with its present-day shortages of labour, equipment and capital.

The paper was illustrated with examples drawn from the industrial field, showing that evolution of electronic control might be slow and might depend on re-design or progressive improvement of related apparatus and technique.

Motor Speed Control

Discussing the need for accurate control of the speed of motors in many processes in the machine tool, textile and printing and paper making industries, it was stated that, with some few exceptions, the accuracy which electronics could ensure was not fully utilized in industry.

A non-electronic background in an industry might retard the adoption of electronic methods.

Thus there was the inertia represented by established methods in the older industries while applications to newer industries, though on a more favourable footing, were naturally retarded by rate of growth of new industrial activity.

Remarking that the foregoing might be construed as an electronic engineer's apology for progress which was not as great as popularly expected, Dr. Whiteley concluded by saying that future progress in electronics was dependent upon improved valve life; 10,000 hour and even 50,000 hour valves were required. Shorter life valves were acceptable in war when the expected life of the complete system was often short. A new yardstick of performance should be accepted by valve engineers. He suggested that at the present time a disproportionate amount of effort was expended on the development and production of electronics for warlike purposes, compared with that devoted to industrial electronic developments.

The electronic engineer must become more closely acquainted with industrial problems. Industrial electronics might be only 25 per cent pure electronics. The desired industrial background was not commonly possessed by the younger engineer, whose wartime electric training was of a particularly specialized nature.

Parsons Diamond Jubilee

SIXTY years ago only one public supply company had installed steam turbo-alternators for generating electricity and the largest machine of that type was of 75 kW capacity. One is reminded of these facts by the appearance of the summer number of the "Heaton Works Journal," which marks the diamond jubilee of the establishment of those works in 1889 by the Hon. C. A. (later Sir Charles) Parsons and traces their growth from two acres and 48 persons, including twelve who went there from Gateshead with Sir Charles, to the present 43 acres and 4,800 employees, including 295 with more than 25 years' service. The story is very well illustrated and, together with the series of 27 articles on the development of the turbo-alternator which have been appearing in this journal, will be a valuable record of engineering history.

Street Lighting Improvements

THE chairman of the Coalville (Leics) Highways Committee switched on the town's new electric street lighting on 1st September. The scheme, which has already cost some £7,000, was commenced in 1937, but was held up by the war. So far 200 lamps have been erected in the main streets and the gas lamps moved to the side streets.

Poulton (near Blackpool) Council is considering a recommendation of the Ministry of Transport to bring street lighting up to the required standard in class "A" roads. The Council's ultimate aim is a scheme to light the whole district by electricity, at a cost in the region of £54,000.

When an electric lighting scheme, comprising 679 lamps, is completed next year at Abercarn, Mon, the main roads will be lighted all night and other roads from dusk to midnight and from 4.30 a.m. to dawn. Lighting has hitherto been by gas.

FINANCIAL SECTION

Company News
Stock Exchange Activities

Reports and Dividends

A. C. Cossor, Ltd., report a consolidated net loss on trading for the year ended 31st March last of £78,615, as compared with a trading profit for the preceding year of £99,405, and after providing for depreciation, bank and other interest, etc., there is a loss of £209,465 (against a loss of £110,153). The balance brought in is £84,585, less balance of subsidiary companies no longer forming the group £66,512, leaving £18,073, and after deducting the year's loss and profits of a subsidiary applicable to outside holders, etc., there is a debit balance carried forward of £195,896.

Reporting on the group's loss, Lord Burghley (chairman) says that this is largely offset by the capital profit of £200,729 which accrued as a result of the recapitalization of cable interests, which includes the undistributed profits of the two former cable companies absorbed by the new Sterling Cable Co. Since the date of the accounts, the company's interest in Electronic Tubes has been disposed of. By this transaction they have succeeded in stopping the main source of the losses which the company has suffered during the last two years. The large economies effected by the closing of the Cossor Radar's Chadderton factory and by the disposal of the valve factory will bear fruit during the current year. The company has made careful plans for the current year, which are estimated to result in a profit on trading.

Aron Electricity Meter, Ltd.—The accounts of this company were reviewed in our last issue. In his statement, which accompanies the report and accounts, Mr. E. D. A. Herbert (chairman) says that the marked falling off in their home trade that became evident in the early part of 1948 worsened throughout the year under review and there are not yet any signs of considerable improvement. They are making progress in their export trade, but have been hampered by currency and other import restrictions. Total turnover for the year fell to two-thirds of that for the year ended 31st March, 1948.

There has been considerable improvement in the quality and standard of reliability of raw material received and improvements are being constantly effected in their own methods of production and in the products themselves. They have proceeded with the reconditioning and modernization of their factories notwithstanding the reduced scale of operations. In August last year the company celebrated its fiftieth anniversary.

With regard to the future, the expansion of their home trade is largely tied to that of the electricity generating plant capacity of the country and to the developments of industrial and domestic uses for electricity. There are already signs that new generating plant is coming into service in many areas of the British Electricity Authority, but it may well be several years before the normal rate of increase in the number of domestic consumers is restored.

George Kent, Ltd., report a trading profit of the holding company for the year ended 31st March last of £381,290, as compared with £176,768 for the preceding year, and a profit after tax of £119,842 (against £51,250). After placing £3,410 to debenture redemption sinking fund, it is proposed to pay a final ordinary dividend of 7 per cent, making 10 per cent for the year, to place £7,750 to employees' assurance scheme, and to carry forward £145,697 (against £54,194 brought in). The ordinary dividend is the same as for the previous year, but the final dividend is paid on larger capital. The consolidated accounts show a trading profit of £393,960 (against £195,382), and after meeting various charges there is a net balance of £126,615 (against £63,149).

T. Clarke & Co., Ltd.—Application has been made for permission to deal in and for a quotation for this company's shares. The authorized capital consists of £100,000 in 2s. ordinary shares, of which £61,815 has been issued. This electrical contracting business was founded over fifty years ago; it became a private company in 1911 and a public company in 1946.

The Harland Engineering Co., Ltd., is to offer to shareholders one new 5s ordinary share at par for every two held and one new 6 per cent 10s cumulative preference at 11s 6d for every three held.

Bylock Electric, Ltd., has decided to defer consideration of dividends on the ordinary shares until the final trading results for the year to 31st July last are known. No distribution was made for 1947-48.

The Sturtevant Engineering Co., Ltd., proposes to distribute a scrip bonus of one new 5s share for each share held, and the

authorized capital is to be increased from £150,000 to £400,000 by the creation of 1,000,000 shares. Treasury permission for the issue has been granted. An extraordinary meeting is to be held on 30th September.

International Combustion, Ltd.—At an extraordinary meeting held on 30th August resolutions were passed approving the scrip bonus to ordinary shareholders of three 5s shares for every two 5s units held.

New Companies

W. A. G. Adams, Ltd.—Registered 29th August. Capital £5,000. To acquire the business of a wireless and general electrical and mechanical engineer and contractor heretofore carried on by Wm. A. G. Adams at Ravine Road, Canford Cliffs, Bournemouth. Directors: W. A. G. Adams, Mrs. D. R. Adams and H. W. Standbridge. Regd. office: 2a, Grand Parade, Haven Road, Canford Cliffs, Bournemouth.

Cambrian Forge & Foundry, Ltd. Registered 25th August. Capital £20,000. To carry on the business of ironfounders, engineers, and engineering and electrical contractors, specialists in the design and manufacture of and dealers in machine parts, precision and other tools, and engineering and electrical and foundry specialists, etc. Directors: A. K. Kirk, J. L. Graham, and R. C. Scott. Regd. offices: 74, Paradise Street, S.E.16.

Hurcar Electrical Co., Ltd.—Registered 26th August. Capital £1,000. Electrical and electronic engineers and contractors, etc. Directors: E. Hurst, J. H. Carson, and A. D. Kneeshaw. Regd. office: Meadow Terrace, Sheffield.

A. Mullord's, Ltd.—Registered 26th August. Capital £500. To acquire the business of an electrical and wireless dealer carried on by A. Mullord at 16, Firs Parade, N.10. A. G. Mullord signs as director. Regd. office: 16, Firs Parade, N.10.

Winding-up Petition

In the Vacation Court on 31st August, Mr. Justice Dankwerts heard a petition by Macreadys Metal Co., Ltd., for the compulsory winding-up of British Rola, Ltd.

Mr. Richard Hunt, who appeared for the petitioners, said they were creditors for £80. He also represented creditors for £107,457. He also asked for leave to appear for additional creditors for £1,158. There had been a suggestion that further capital should be raised and an offer to purchase the property had been received from Industrial & Commercial Finance Corporation, Ltd., which would provide an estimated surplus of £130,000 over a debenture indebtedness of £10,000. It was conditional on the company being wound up. The shareholders had declined to pass a winding-up resolution and the creditors had approved an application for the compulsory winding-up of the company.

Mr. Geoffrey Cross, K.C., for the shareholders who opposed the petition, said that two further offers had been received which would give the unsecured creditors 20s in the £; higher offers might be made. Application had been made to the Capital Issues Committee for leave to issue further capital to enable the company to be kept on foot. Mr. Shelford appeared for the respondent company and Mr. Hesketh for a receiver appointed by the bank.

His Lordship said he would adjourn the petition for a fortnight to see whether the consent of the Capital Issues Committee could be obtained.

Increases of Capital

Bowthorpe Holdings, Ltd.—Increased by £99,900 in £50,000 preference shares of £1 each and 499,000 ordinary shares of 2s each, beyond the registered capital of £100. The capital is now £100,000 in 50,000 six per cent cum. red. pref. shares of £1 each and 500,000 ord. shares of 2s each.

Tipton Electrical Repairs, Ltd.—Increased by £3,000, in £1 ordinary shares, beyond the registered capital of £2,000.

Electrical Installations, Ltd.—Increased by £100,000, in £1 shares, beyond the registered capital of £50,000.

Wm. Allan Smith & Co., Ltd.—Increased by £40,000 in £1 shares beyond the registered capital of £10,000.

Bankruptcies

R. L. Foggin, lately carrying on business as Tithebarn Radio Co., at 63, Tithebarn Street, Liverpool, as Crosby Radio Co., at 75, Crosby Road North, Waterloo, Liverpool, and as High Bridge Radio Co., at High Bridge, Newcastle-on-Tyne, electrical engineer.—Application for discharge to be heard on 29th September, at the Court House, Fruit Exchange Buildings, 18, Victoria Street, Liverpool, 3.

T. Sharpe, electrical contractor, lately carrying on business at 62, Oldham Road, Springhead, Yorks.—First and final dividend of 20s in the £, payable 13th September at the Official Receiver's office, 20, Byrom Street, Manchester.

Liquidations

Reliant Radio Service, Ltd.—Winding up voluntarily. Liquidator, Mr. D. R. Clack, Adelaide House, King William Street, London, E.C.4.

FINANCIAL SECTION
STOCKS and SHARES

THIS was to have been the week in which, according to the Foreign Secretary, history might be made. In advance, Stock Exchange markets proceeded on very languid lines. British Government and other gilt-edged issues kept moderately steady, purchases being somewhat restrained for fear that the Washington meetings this week might result in nothing more than a continuation of uncertainty for the time being.

Crompton Parkinson

The company's accounting period was altered to close this year in June, instead of September as before, with the anticipated result that the annual meeting will in future be held, and the final dividend paid, before the end of December. Preference stockholders are to receive a three-months dividend at the close of this month, and normal payments thereafter at half-yearly intervals. With the 5s ordinary shares at 23s 6d, the yield of 4¾ per cent on last year's distribution betokens confidence that the group's main preoccupation (with capital equipment) assures satisfactory figures in the coming accounts. Developments in connection with the electric vehicle subsidiary, owned jointly with Austin Motors, have lately been attracting attention.

Bonus Issues

International Combustion shares are now quoted ex rights to the bonus issue. Old and new shares are both 17s 3d middle. The new issue took the shape of three shares for every two 5s units held, and the new stock ranks for all dividends declared after the date of issue, which was 31st August. The new shares are, at present, free of stamp duty.

The Midland Electric Manufacturing Co. has also increased its capital by the issue of a bonus, and the £1 shares stand at 55s middle. Holders of the old shares received two new shares for every existing share held, the new shares to rank for dividend as from 1st January this year.

Cossor Results

According to the chairman's summary of prospects, A. C. Cossor's group net loss of about £200,000 for 1948-49 should mark a change in the company's fortunes. The subsidiary mainly responsible for the deficit has been disposed of; together with other economies, this measure should bear fruit in no uncertain manner this year, says Lord Burghley. On its present course, the business is expected to come out on the right side in the current year. The 5s ordinary shares, which received their most recent dividend two years ago, remain about 5s 6d. The 6 per cent preference, which have had no dividend for eighteen months, are 15s.

Matters of Moment

Something of a feature has been provided by a jump in the price of Japanese Bonds, and Tokyo Electric 6 per cents at 47½ compare with 31 as the lowest previously touched during the present year. The new issue market has been encouraged by the success achieved by the offer of W. H. Smith ordinary and preference shares. A heavy over-subscription revived talk of probable new issues by a number of industrial companies which are known to be awaiting a favourable opportunity to secure fresh money for expansion. This week's meeting of the T.U.C. had less effect upon prices than frequently, in the past, these annual gatherings have exercised over Stock Exchange quotations. British Electric Traction deferred put on 40 points at 16⅝. Joseph Lucas at 77s 6d are 3s 9d better on talk of a possible bonus issue in the near future. Palestine Electric at 28s 6d show a loss of a florin, on the figures published last week.

T. Clarke & Co.

T. Clarke & Co., the electrical contractors, in business for the last fifty years, have an issued capital of £61,815 in florin shares, and arrangements have been made for a placing on the Stock Exchange market. It is expected that the first offer will be on the basis of 3s 4½d. For the last three years, dividends of 18 per cent per annum have been paid. At the price quoted, 3s 4½d, the yield on the 18 per cent dividend would be nearly 11 per cent—a high yield even in these days.

Yields Now

Yields on the medium and longer-dated Government stocks, such as British Transport "threes," have risen since the beginning of the year from less than 3 to about 3¼ per cent. On a "blue-chip" industrial such as Associated Electrical Industries ordinary, the corresponding rise in yield from £3 16s 9d to £4 4s 6d per cent is in about the same proportion, and demonstrates the close affinity between security values in the gilt-edged, and the top levels of the industrial markets. As an illustration of the investment preference for heavy, as opposed to light, engineering shares, both General Electric and E.M.I. ordinary started the year on a 3.9 per cent yield basis: on G.E.C. the present return is £4 7s 1d per cent, but on E.M.I. it has gone up to £5 6s 8d per cent.

Electricity Supply

Clunie Tunnel Join-up : Further Load Spreading Arrangements

AN important stage in construction of the North of Scotland Hydro-Electric Board's Tummel-Garry scheme in Perthshire was reached on 30th August when a 700 lb charge of gelignite shattered a 9ft plug of rock and brought to an end the task of driving the Clunie tunnel. The charge blew out the last of 400,000 tons of rock excavated from the tunnel and after three years' work the drilling crews met under the surface. The junction, which was exact to within ½in about 1,900 ft from the intake end of the tunnel, and was celebrated in customary style by the broaching of four barrels of beer. The tunnel, the biggest water power tunnel in Britain, will lead water from the Board's Clunie Dam to the generating station at the junction of the Rivers Tummel and Garry. It is 9,158ft long and is horseshoe in section with an equivalent diameter of 23ft. Already 54 per cent of it has been lined with concrete and it is hoped that the lining will be completed in the autumn. Altogether 12,500 tons of cement will be used to make the 40,000 cu yd of concrete required to line the tunnel. When fully operational the tunnel will carry about 2,600 million gallons of water per day to the three 19,000 kW vertical Francis turbo-alternators at Clunie generating station. It is hoped to have one of the turbines in production by next spring.

Passamaquoddy Tidal Power

Strong opposition to the long-discussed Passamaquoddy tidal power project was voiced at St. Andrews, New Brunswick, when witnesses representing the fishing industry testified at a session ending a one-day Canadian sitting of the International Joint Commission. Senator A. Neil McLean said that when the plan was first considered about 20 years ago his firm had favoured it because of the prospect of cheap power, but since then he could find no evidence that power produced at the proposed site would be cheap. The fishing industry had increased five or six times in the last 20 years but further expansion had been hindered by uncertainty of the future. When Sen. McLean began reading from a U.S. Federal Power Commission report recommending against a tidal power plant at the Passamaquoddy site, Mr. B. McWhorter, engineering member of the Joint Commission said that the report referred only to the development in Maine. The Federal Power Commission had suggested that investigation into the feasibility of the project in both Maine and New Brunswick might be worth while. Mr. H. W. Welch, president of the New Brunswick Fish Canners' and Assemblers' Association, said that the Association would not be opposed to a full-scale investigation if it included the effect of the project on Bay of Fundy fisheries.

Electricity Output

During the week ended 26th August 734.7 million kWh was sent out for public supply from solid fuel fired stations of the B.E.A. and North of Scotland Hydro-Electric Board. This was 7.3 million kWh more than in the previous week and 27.6 million more than a year ago (week ended 27th August, 1948).

Dumfries Reinforcement

Growth in demand for electricity in Dumfries and district has made it necessary for the S.W. Scotland Electricity Board to reinforce the existing supply system. It has been arranged that additional supplies are to be taken at the Board's substation at Marchmount, Dumfries, from the British Electricity Authority and the Board has approved a reinforcement scheme which involves the installation of additional switchgear at Marchmount, the extension of the existing main substations at Penpont, Lockerbie, Ecclefechan, Annan, and Gretna, and the construction of a new substation at Langholm. In addition, new overhead lines will be erected between Marchmount and Annan, and also between Ecclefechan and Langholm, and part of the main line running from Annan to Greta will be reconstructed. The scheme is estimated to cost the Board £177,430.

Load Spreading

Industries in Leeds, Harrogate and York districts are to be asked to operate staggered hours schemes from 21st November to 3rd March on similar lines to last year when a five-day rota scheme was in operation, and to move load internally during October, the first three weeks in November and from 3rd March.

Although there was a criticism that the plan was too complicated to explain to employees, a staggered hours scheme for

Colne Valley has been approved as an alternative to internal load spreading. It provides for the division of consumers into ten groups and is based on a daily rota. It will operate from 3rd October to 31st March. Commercial and industrial undertakings not wishing to vary their working hours must submit load spreading schemes which will produce the necessary saving.

Southern Area Districts

Speaking recently at Salisbury, Mr. N. F. Gadsdon, Bournemouth Sub-Area manager, Southern Electricity Board, said that the number of districts was being reduced to six and Salisbury City and Salisbury Rural were being combined. Mr. R. A. McCulloch would remain manager of the new Salisbury district and Mr. M. C. Clissold, manager of Salisbury Rural, would take up a new appointment at Yeovil.

Tasmanian Project

Drilling has been completed at the power station site at Trevallyn, near Launceston, for the Tasmanian Hydro-Electric Commission's Esk power scheme. Tenders for generating plant close this month. The whole output will be absorbed by aluminium works to be established at Bell Bay.

Aircraft Electrical Equipment

THIS YEAR'S DISPLAY AT FARNBOROUGH

THE annual flying display and exhibition of aeronautical equipment and instruments, organized by the Society of British Aircraft Constructors (S.B.A.C.) is now being held at the Royal Aircraft Establishment, Farnborough, Hants. As has been the case with previous exhibitions in the series, this year's display (6th-11th September) includes a number of electrical items.

Airport lighting is a prominent feature of the stand of the General Electric Co., Ltd., together with galley appliances and items for the passenger cabin. Other exhibits include lightweight fluorescent lighting fittings with miniature chokes and capacitors for 400 c/s supplies, communication equipment and Pirelli-General cables.

The British Thomson-Houston Co., Ltd., shows magnetos and distributors, actuators, a.c. and d.c. motors, d.c./a.c. motor-generator sets with electronic control, a variety of circuit breaking devices, and cartridge-fired turbo-starters. There is also a comprehensive display of "Mazda" lamps for use in aircraft.

Ferranti, Ltd., exhibit a miniature receiver for console and radio range signals with provision for R/T reception, a gyroscopic gun sight with ancillary equipment, forming a complete fighter aircraft fire control installation, miniature hermetically sealed transformers, and a crossed pointer instrument which indicates the departure of an aircraft from the tracks of an instrument landing system in azimuth and elevation.

The exhibits of Salford Electrical Instruments, Ltd., include an improved radio compass, a selection of quartz crystal units for aircraft and general radio communication services and the Radio Sonde which was developed in conjunction with the Meteorological Office. Marconi's Wireless Telegraph Co., Ltd., shows a high-power aircraft radio transmitter, light weight receivers and transmitters, navigational and landing aids and automatic voltage regulator units.

Sangamo Weston, Ltd., have instruments for use with navigational systems, temperature measurement and electrical power indication as well as relays, thermocouples, thermometer bulbs and examples of various ground test sets. On the stand of E. K. Cole can be seen the recently developed "Ekco" cloud and collision warning radar apparatus and a new multi-channel transmitter/receiver

Aircraft batteries of all types and sizes are exhibited by the Chloride Electrical Storage Co., Ltd., Oldham & Son, Ltd., and Peto and Radford, Ltd. Navigational instruments and auxiliary equipment are shown and demonstrated by Henry Hughes & Son, Ltd., and Kelvin, Bottomley and Baird, Ltd., exhibit an improved maximum safe airspeed indicator, a Machmeter which indicates the percentage of the speed of sound at which an aircraft is flying, a four-engine synchroscope, sensitive pressure gauges, and various other instruments.

The "Canberra" a jet-propelled bomber which has been designed and manufactured by the English Electric Co., Ltd., is on view for the first time. It is a mid-wing monoplane, for high altitude, high performance bomber duties, and is powered by two Rolls Royce "Avon" axial flow jet turbines.

The main exhibit of Murex Welding Processes, Ltd., is an engine-driven ground power unit supplying the electrical power required for pre-flight checks, general servicing and the starting of all types of aircraft. It operates at 28.5 V and supplies 600 A continuously with a peak starting current of 900 A.

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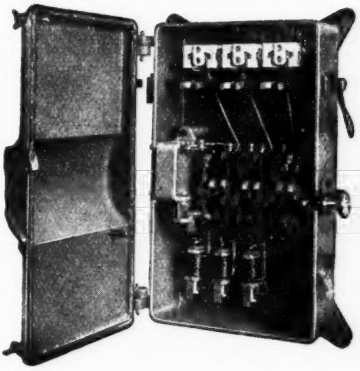

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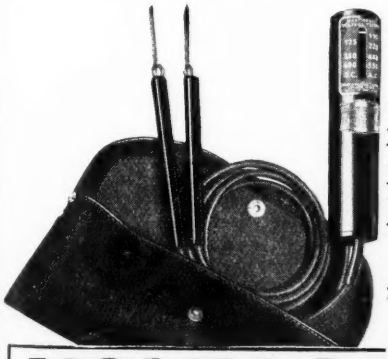

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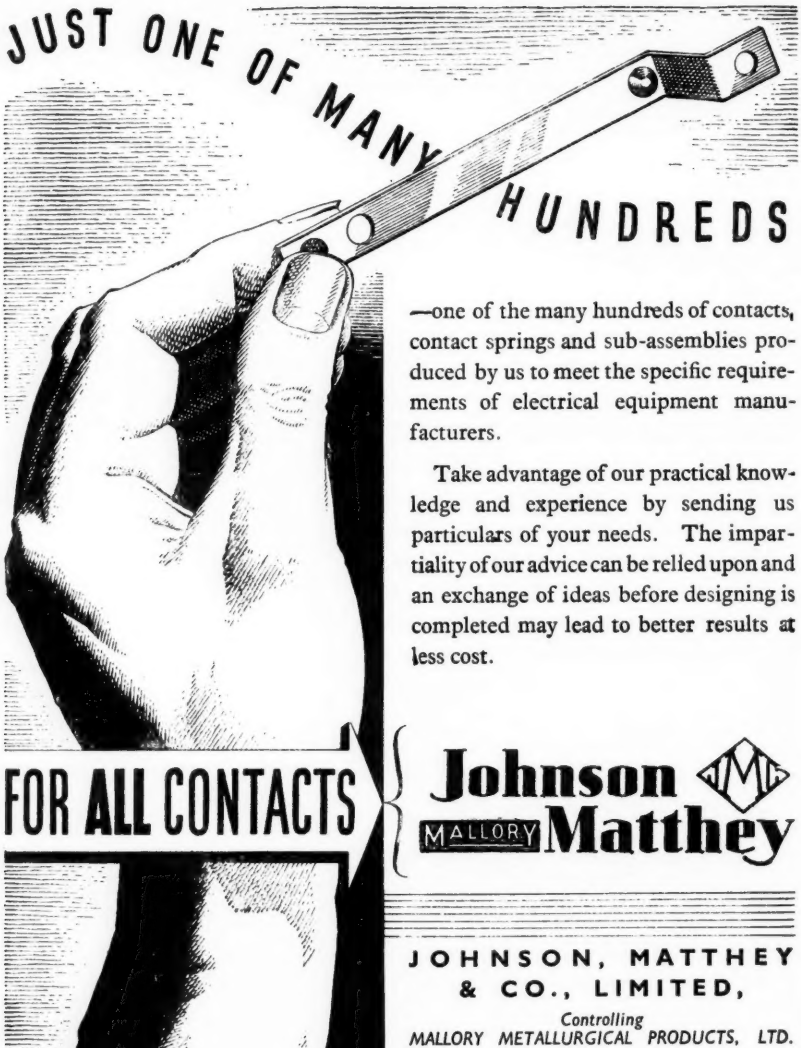

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NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (2s each) may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2.

1944

1813. Metropolitan-Vickers Electrical Co., Ltd., and Tustin, A.—Sighting arrangements for guns and the like. 31st January, 1944. (627824.)

1945

5616. Stevens, A. H. (Submarine Signal Co.).—Instrument dials for depth sounding indicators. 6th March, 1945. (Convention date not granted.) (627827.)

7159. General Electric Co., Ltd., and Gavin, M. R.—High-frequency electric heating apparatus. 21st March, 1945. (627963.)

12739. Holman Bros., Ltd., and Cram, M.—Rock drilling apparatus. 22nd May, 1945. (627828.)

18972. Poor & Co.—Electroplating metals. 14th April, 1945. (627964.)

23946. Imperial Chemical Industries, Ltd., and Ravenscroft, A. W.—Electrolytic cells. 17th September, 1945. (627967.

29154. British Thomson-Houston Co., Ltd.—Electric control circuits. 7th November, 1944. (627831.)

1946

376. Intertype, Ltd.—Swivel terminals for cables. 9th June, 1945. (627834.)

1957. British Thomson-Houston Co., Ltd.—Electric lampholders for tubular electric lamps. 22nd January, 1945. (627893.)

5806. Sulzer Frères Soc. Anon.—Steam power plants provided with feed water pre-heaters and feedwater accumulators. 23rd March, 1945. (627837.)

7208. Automatisk Ror-Kontrol Aktieselskabet.—Automatically controlled electric steering equipment for vessels or aircraft. 12th February, 1942. (627974.)

10071. Crompton Parkinson, Ltd., and Wickham, A. H.—Variable-ratio gearing applicable to price-change or rate-change gearing for use in prepayment mechanism. 1st April, 1946. (627894.)

12098 and 12511. Bendix Aviation Corporation.—Earth induction system. 18th April, 1945. (627978/9.)

15071. Compagnie Générale de Télégraphie sans Fil.—Valves of the velocity modulation type. 25th March, 1944. (627980.)

19218. Submarine Signal Co.—Methods and apparatus for radio echo ranging. 20th March, 1941. (627982.)

21725. Marconi's Wireless Telegraph Co., Ltd.—Optical projection systems. 20th July, 1945. (627983.)

22752. Marconi's Wireless Telegraph Co., Ltd.—Detection of modulated carrier waves. 31st July, 1945. (627985.)

24670. United Anodising, Ltd., Napier, D. H., and Westwood, J. V.—Electrolytic polishing of aluminium and its alloys. 19th August, 1946. (627854.)

26810. Foster Transformers & Switchgear, Ltd., and Jennings, R. E.—Vibrating beam test apparatus. 6th September, 1946. (628038.)

27611. Freccia, V.—Electrical apparatus for recording, reproducing or transmitting sound signals. 5th January, 1946. (627991.)

31426. Westinghouse Brake & Signal Co., Ltd., Peter, L. H., and Shipp, D. G.—Intermittent inductive train control systems. 23rd October, 1946. (627867.)

32744. Hazeltine Corporation.—Wave-signal filter system. 8th November, 1945. (627870.)

34862. General Electric Co., Ltd., and Durrant, D. W.—Electric lighting fittings. 25th November, 1946. (627997.)

35034. Western Electric Co., Inc.—Multiplex pulse systems of radio communication. 11th December, 1945. (627998.)

35491. British Thomson-Houston Co., Ltd.—Apparatus for testing the insulation between turns and between layers of a transformer winding. 30th November, 1945. (627999.)

35559. Pye, Ltd., and Lawson, D. I.—Radio antenna array for the reception of ultra-short waves. 30th November, 1946. (628001.)

37405. Igranic Electric Co., Ltd.—Apparatus for control of high-frequency circuits. 31st December. 1945. (628004.)

37544. Brown & Co., Ltd., J., and Crowe, T. A.—Gas turbine installations having more than one driving shaft. 20th December, 1946. (627878.)

37784. Marconi's Wireless Telegraph Co., Ltd.—Cold cathode rectifiers. 28th December, 1945. (628005.)

1947

555. Geloso, G.—Radio coils and transformers. 10th May, 1946. (628006.)

1756. Naamlooze Vennootschap Philips' Gloeilampenfabrieken. — Luxmeters. 1st December, 1943. (628007.)

2071. Automatic Telephone & Electric Co., Ltd., Roseby, P. N., and Rickaby, A.—Loudspeaking telephone equipment. 23rd January, 1947. (628008.)

2767. Philips Lamps, Ltd.—Supports for luminous tubes. 16th February, 1944. (628009.)

3265. Thompson & Co. (Sunbury), Ltd., R. E., and Benford, P. R.—Thermostatic electric switches. 4th February, 1947. (628010.)

4327. Babcock & Wilcox, Ltd., and Suckling, L. J.—Mechanical stokers. 14th February, 1947. (627758.)

4942/3. British Thomson-Houston Co., Ltd.—Methods of preparing hydrocarbon-substituted halosilanes. 21st February, 1946. (628042/627764.)

5440. Philips Lamps, Ltd.—Electric-discharge tubes comprising a capacitative igniter. 28th February, 1946. (628013.)

5836. Standard Telephones & Cables, Ltd.—Television modulation systems. 30th March, 1946. (628015.)

6242. Western Electric Co., Inc. — Carrier wave telephone system. 9th March, 1946. (Addition to 627314.) (627766.)

6904. Babcock & Wilcox, Ltd.—Vapour generators. 12th March, 1946. (628017.)

6929. Allen, F. J.—Dynamo-electric machines. 12th March, 1947. (628018.)

7770. Automatic Telephone & Electric Co., Ltd., and Woodland, C. R.—Mounting of electrical equipment. 21st March, 1947. (627770.)

8463. Kolster Brandes, Ltd., and Gifford, J.—Inductance coils. 28th March, 1947. (628024.)

9464. Patelhold Patentverwertungs & Elektro-Holding Akt.-Ges.—Arrangement for the automatic stabilization of the mean frequency of a frequency-modulated generator. 12th April, 1946. (628027.)

9671. Heat Exchangers, Ltd., and Toogood, G. D.—Gas turbine plants. 11th April, 1947. (627896.)

9897. Philips Lamps, Ltd.—Mixing circuits for superheterodyne receivers. 19th August, 1944. (628029.)

10889. Hazeltine Corporation.—Electric wave-signal coupling systems. 16th May, 1946. (628046.)

11321. General Electric Co., Ltd., Craft, E. H., and Randall, H.—Electric motor control systems. 28th April, 1947. (627781.)

11325. General Electric Co., Ltd., and Muddiman, P. V. — Speed-reducing gearing. 28th April, 1947. (627782.)

11478. Hindmarch, T., and Mensforth, T.—Driving mechanisms of electrically-propelled road or rail vehicles. 29th April, 1947. (628051.)

12070. Westinghouse Electric International Co.—Electrically insulating coatings on ferrous metals. 10th May, 1946. (628054.)

13405. Standard Telephones & Cables, Ltd.—Pulse generating systems. 30th December, 1943. (627790.)

13533. Philips Lamps, Ltd.—Apparatus for causing electric oscillations to be frequency-modulated or phase-modulated by sound oscillations. 23rd May, 1946. (628057.)

13963. Siemens Bros. & Co., Ltd., and Double, H. S. Electric converting systems. 23rd May, 1947. (627791.)

14018. Birlec, Ltd.—Induction furnaces. 17th October, 1946. (627792.)

14194. British Thomson-Houston Co., Ltd.—Rubber-like compositions and methods of preparing the same. 29th May, 1946. (628059.)

14316. Johnson & Phillips, Ltd., and Hollingsworth, P. M.—Electric cables. 29th May, 1947. (627793.)

15256. General Electric Co., Ltd., and Bignell, G. J. H.—Clips for securing electrical contact members. 10th June, 1947. (627908.)

16365. Southern United Telephone Cables, Ltd., and Mackenzie, W. A.—Means for controlling automatically the speed of take-up of an electric cable or other member undergoing a manufacturing process. 20th June, 1947. (627799.)

18662. Johnson & Phillips, Ltd., and Hollingsworth, P. M.—Electric cables. 14th July, 1947. (627815.)

19117. Saunders, R.—Refrigerators, cold storage chambers and the like. 17th July, 1947. (628069.)

19131. Poor & Co.—Electroplating copper. 19th April, 1947. (627817.)

20113. British Thomson-Houston Co., Ltd.—Photo-sensitive discharge devices. 27th July, 1946. (628071.)

20533. Heenan & Froude, Ltd., and Hayes, C. T.—Electrical driving mechanism. 30th September, 1947. (627822.)

20721. Dennis, H. P., and Dennis, J. P.—Quick make-and-break electrical switches, circuit breakers or like mechanisms. 31st July, 1947. (628074.)

21009. English Electric Co., Ltd., and Asbury, A.—Electric motor control systems. 1st August, 1947. (627922.)

21018. Standard Telephones & Cables, Ltd.—Electric multiple contact spring pile-up switches. 10th August, 1946. (627923.)

21277. Sylvania Electric Products, Inc.—Apparatus for impact testing of electrical devices having circuit elements enclosed in a container. 18th November, 1942. (628075.)

21833. Westinghouse Electric International Co.—Metering circuit for X-ray apparatus. 23rd October, 1941. (627929.)

22668. Chapman, G. A.—Electrically heated airers. 14th August, 1947. (627932.)

22690. Standard Telephones & Cables, Ltd., Roche, A. H., and Roe, F. O.—Housings for appratus installed in subaqueous cables. 15th August, 1947. (627933.)

24144. Cherry, E. C., and Rao, V. N.—Electric pulse signalling systems. 1st September, 1947. (627942.)

24386. Vickers, Inc.—Rotary pumps and motors. 5th September, 1946. (628084.)

24397. Harley, M. C.—Aircraft landing lamps. 4th September, 1947. (627946.)

24575. Schrever, E. P.—Steam electric irons. 25th September, 1946. (628085.)

24730. Ericsson Telephones, Ltd., and Crowe, D. C.—Electromagnetic relays. 9th September, 1947. (627952.)

24765. General Electric Co., Ltd., and Sowter, A. B.—Cold welding of ductile metals. 9th September, 1947. (628086.)

24798. Permoid, Ltd., and Bilden, J.—Electric bread toasting appliances. 9th September, 1947. (628087.)

24855. English Electric Co., Ltd., and Hassler, E. H. H.—Welding manipulators. 10th September, 1947. (628088.)

24872. General Electric Co., Ltd., and Furneaux, W. D. C.—Electrodes for use in diathermic or like apparatus. 10th September, 1947. (628089.)

24885. British Thomson-Houston Co., Ltd.—Steam pressing irons. 11th September, 1946. (628090.)

24924. Dunlop Rubber Co., Ltd., and Blewitt, R. H.—Apparatus for dielectric heating. 11th September, 1947. (628092.)

25725. General Electric Co., Ltd., and Rose, W. R.—Electromagnets with movable armatures. 22nd September, 1947. (627958.)

26171. Speed Development Co., Ltd., Fuller, R. C., and Ruffle, W. H.—Fluid-pressure operated electric switches. 26th September, 1947. (628098.)

28761. Metropolitan-Vickers Electrical Co., Ltd., and Elce, N.—Gas turbine power plant. 28th October, 1947. (627959.)

28903. Metropolitan-Vickers Electrical Co., Ltd., and Elce, N.—Gas turbine power plant. 29th October, 1947. (627960.)

1948

7278/9. Atkinson, J.—Bladed rotors for axial-flow turbines and similarly bladed fluid-flow machines. 30th November, 1945. (Divided out of 628036.) (628100.)

7981. Atkinson, J.—Stator structures of turbines and similar fluid-flow machines. 30th November, 1945. (Divided out of 628036.) (628102.)

1949

12917. Automatic Telephone & Electric Co., Ltd., Roseby, P. N., and Rickaby, A.—Loud-speaking telephone equipment. 23rd January, 1947. (Divided out of 628008.) (628033.)

Amended Specifications

585656. Hecht, N. F. S., and another.—Indicating or controlling the course of aircraft in radio beacon systems.

595673. Marconi's Wireless Telegraph Co., Ltd.—Thermionic valve circuit..

598152. New Day Electrical Accessories, Ltd., and another.—Electrical switches, socket outlets and like electrical accessories.

605088. Maschinenfabrik Oerlikon.—Regulating a gas turbine plant.

613368. Standard Telephones & Cables, Ltd., and another.—High-frequency heating equipment.

Fatalities

Earth Wire in Lighting Adaptor.—An earth wire inserted into an adaptor used to connect an electric iron flex to the kitchen light point caused the death of Josiah Fiddler (33), fitter mechanic, of Darlaston. At the inquest it was stated that he was about to press his trousers with the iron when the accident occurred. Edith May Shields, his sister, said that she fitted the adaptor to the iron in the same way as she did to her own. There were three wires and the green one she bent back. She could not account for its being found tucked inside the adaptor. The coroner recorded a verdict of "Accidentally electrocuted."

Fatal Shock While Swimming.—Through coming into contact with a broken electric cable while swimming in a mill leat a 17-year-old youth received a fatal shock. At the inquest at Tiverton, Mr. H. I. Stone, maintenance engineer at the factory, said that the 230 V cable concerned was used to supply a school building on the opposite side of the leat. On the factory side it was 16 to 18ft above water and sloped to above 9ft on the other side. He had no idea it was broken; it was some time since the school lights had been used. He believed the breakage was caused by the cable rubbing against some bushes. Medical evidence was given that artificial respiration was applied without result. In recording a verdict of "Death by misadventure," the deputy borough coroner said the evidence showed that the factory leat was private property and was not a suitable playground.

CONTRACT INFORMATION

ACCEPTED TENDERS AND PROSPECTIVE ELECTRICAL WORK

Contracts Open

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses.

Argentina.—BUENOS AIRES.—11th October. Hydro-electric plant at Sanagasta. (C.R.E. (I.B.) 22892/49. Ten/586.)*

Australia. — MELBOURNE. — 9th November. State Electricity Commission of Victoria. Steel framed workshop and stores buildings. (2nd September.)

21st September. Supply of mobile cranes and diesel tractors. (See this issue.)

Bath.—Education Committee. Electrical installation in Fosseway Junior and Infants' Schools. (2nd September.)

Belfast.—30th September. Electricity Department. V.h.f. fixed and mobile radio telephone equipments. (See this issue.)

Edinburgh.—30th September. North of Scotland Hydro-Electric Board. Lighting, heating and auxiliary cabling installations at Grudie Bridge power station. (2nd September.)

Finsbury.—28th September. Borough Council. Installation of fluorescent lighting in the swimming pool at Merlin Street. Baths superintendent, Public Baths, Merlin Street, London, W.C.1.

Luton.—26th September. Corporation. Electrical installation at 63-69, Guildford Street. (See this issue.)

New Zealand.—WELLINGTON.—31st January. State Hydro-Electric Department. Four 3,333 kVA transformers. (C.R.E. (I.B.) 23791/49. Ten/618.)*

Plymouth.—16th September. City Council. Supply of electricians' sundries to various departments and establishments for the period commencing 1st October next. Forms of tender from the stores officer, Stores Department, Mill Street.

Slough.—21st September. Corporation. Trunk road lighting scheme. (See this issue.)

South Africa.—PRETORIA.—17th October. City Council. 33kV and lower voltage cables and accessories. (26th August.)

Southern Rhodesia.—UMTALI.—12th October. Muncipality. 11kV cable and joint boxes and trifurcating boxes. (C.R.E. (I.B.) 22310/49. Ten/590.)*

Southport.—12th September. Corporation. Sodium street lighting system. (2nd September.)

Tangier.—30th September. Telefonica de Tangier S.A. Group of 500 lines for extension of the automatic exchange. (C.R.E. (I.B.) 23497/49. Ten/625.)*

* Specifications may be inspected at the Commercial Relations and Exports Department, Thames House North, Millbank, S.W.1.

Orders Placed

Iran.—Anglo-Iranian Oil Co. Bending machines (£9,000).—Chamberlain Industries, Ltd.

Maidstone.—Corporation. Electrical wiring of houses on the Shepway estate:—28 houses and 24 flats (£1,091).—W. R. Pellett & Sons.—Four flats and four maisonettes (£208.).—F. J. Contract Services.

Seaton Valley (Northumberland).—U.D.C. Electrical installations in 18 houses at Murton Grange; J. B. Wilson, Newbiggin. Installations 38 houses at Seghill; C. N. Whitfield, Monkseaton.

Sutton Coldfield.—Corporation. Sound equipment in Town Hall and Council House (£580).—Potter Sound Systems.

Swansea.—Corporation. Electrical installations at Cadle New School (£1,256).—Electrical & Associated Services.

Contracts in Prospect

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Alcester.—Houses (34) for R.D.C.; Francis B. Andrews & Son, 95, Colmore Row, Birmingham.

Alnwick.—Houses (40) for the R.D.C. at Crasterm, Embleton and Felton; T. J. Cahill, architect, Lloyds Bank Chambers, Alnwick.

Bath.—Dwellings (130), Twerton and Stirtingale sites; city surveyor.

Belper.—Houses for R.D.C.:—Holrook (32); Milward & Sons, Belper. Horsley Woodhouse (14); Harris Bros. Marehey (4); Pidcock & Beastall, Alfreton.

Bishop Auckland.—Alterations to Bishop Auckland General Hospital for the Regional Hospital Board; Fennell & Co., architects, Bridge End Chambers, Chester-le-Street, Co. Durham.

Blantyre.—Factory; Boyd Bros., 16, Hamilton Road, Cambuslang.

Bournemouth.—Block of offices, Christchurch Road; Westover Garages, Ltd., Westover Road.

Bristol.—Flats (63), in four blocks, Clifton Vale, Hotwells; Pyle & Saint, architects, Cirencester.

Bullingdon.—Houses (36), Watlington, for R.D.C.; H. W. Smith, architect, 29, George Street, Oxford.

Burgess Hill (Sussex).—Alterations at Marle Place, Leylands Road, for children's home; J. Catchpole, county architect, County Hall, Lewes.

Bury.—New schools at Elton, Hardmans-in-Fields, Fairfield and Walmersley; J. Chadwick, borough surveyor.

Caterham.—Flats (12), junction of Godstone Road and Tupwood Lane; E. H. Hunt, 5, Pashley Road, Eastbourne.

Cheadle (Staffs).—Houses for R.D.C.:—Cronny Bank, Cheddleton (16); W. Brammar & Co., Hartshill, Newcastle, Staffs. Church Lane, Ipstones (4); J. A. Bailey, Tape Street, Cheadle.

Chelmsford.—Shops and flats (eight), Broomfield Parade, Broomfield Road; Omega Properties, Ltd., 11, Weston Road, Southend.

Corby.—Junior school (£66,925) for Northants C.C.; county architect, Northampton.

Dover.—Rebuilding Charlton Mills; G. W. Chitty & Co., millers, Leybourne Road.

Dumbarton.—Traditional houses (50), Castlehill; J. A. M'Kittrick, town clerk, Council Offices.

Durham.—X-ray department and chest clinic at Dryburn Hospital for the Newcastle-on-Tyne Regional Hospital Board; P. H. Knighton, Board's staff planning architect, Osborne Road, Newcastle-upon-Tyne.

Block of lecture rooms above the existing science college buildings for the Council of Durham University, (£150,000).

New fire brigade headquarters, Durham; county architect, Court Lane.

Workshop block, Stockton Technical College, new primary school, Simonside, Jarrow, and new technical college at Billingham for the C.C.; R. H. Duns, quantity surveyor, Jesmond, Newcastle-on-Tyne.

Eccleston.—Infants' and junior school, for Lancashire E.C.; Greenfell Baines Group, architects, 12, Guildhall Street, Preston.

Elstree.—Houses (53), King Edward Road, for U.D.C.; surveyor.

Eton.—Conversions at old fire station, High Street, for administrative offices; U.D.C. surveyor, 138, High Street.

Felling-on-Tyne.—Conversion of Windy Nook Isolation Hospital into nurses' preliminary training school; J. and W. Lowery, builders, Corporation Street, Newcastle-on-Tyne.

Fishguard.—Secondary school; Walter Barrett, county architect, Haverfordwest.

Galway.—Hospital and other buildings, for Regional General Hospital; Dermot M. O'Dwyer's, architects, 25, Suffolk Street, Dublin.

Gateshead.—Offices and canteen, South Shore Road, and 12 houses Saltwell estate for J. Rank, Ltd., millers; W. Thornton & Sons, Ltd., Liverpool.

Additions to the Central Library for the T.C. (£17,000); H. J. Cook, chief architect, Municipal Buildings.

Glasgow.—Factory, Lochburn Road; Wm. Baillie & Son, architects, 4, West Regent Street.

Extensions to Stow College; city education architect, Bath Street.

Gravesend.—Houses (86), for T.C.; Association of Building Trade Employers.

Great Yarmouth.—Flats (150), Telegraph House site, for T.C.; borough engineer.

Guildford.—Houses (92), Bellfields and South Way; borough surveyor.

Haltwhistle.—Houses (150), near the Comb Hill housing scheme; R.D.C. surveyor.

Harrow. — Dwellings (180), Grove estate, Pinner; and flats (132), Alexandra Avenue; H. Wells, clerk, Council Offices, Harrow Weald Lodge.

Haydock.—Houses (40), Church Road; R. Main, surveyor, Urban Council Offices.

Lewes.—Primary junior school, Wallands (£52,000), for East Sussex E.C.; county architect, County Hall.

London.—HOLBORN.—Flats, Guildford Street; borough architect.

MARYLEBONE.—Offices, workshops, etc., 7a, Chiltern Street; J. Preedy & Sons, Ltd., 58, Chiltern Street.

WHITEHALL.—Block of offices, Richmond House site; Ministry of Works, Abell House, John Islip Street, S.W.1.

WIMBLEDON.—Extensions to Technical College, for Surrey E.C. (£43,500); county architect, Kingston-on-Thames.

Macclesfield.—Houses (40), Ivy Road estate; borough architect.

Middlesbrough.—Conversion of North Riding Infirmary into E.N.T. and Eye Hospital for Newcastle-on-Tyne Hospital Board, Jesmond, Newcastle-on-Tyne; P. H. Knighton, Board's staff architect.

Newcastle-on-Tyne.—Pathological institute at the General Hospital for the Newcastle Hospital Board; P. H. Knighton, staff planning architect.

Adaptation of Smallpox Hospital on the Town Moor as plastic surgery unit; Spence and Price, architects, St. Mary's Place.

Northumberland.—Schools for the partially sighted (£25,000), and subnormal children (£40,000), at Morpeth for the C.C.; county architect, County Hall, Newcastle-on-Tyne.

Stockton-on-Tees.—Hall, Newlands Avenue, for the St. John Ambulance Brigade; M. Trotter, architect, 133, High Street.

Houses (24), Hillcrest Avenue, etc.; Premier Dwellings, Ltd., builders, Middlesbrough.

Houses (42), Hermitage estate; Moorhouse & Barker, Ltd., builders, Thornaby Road.

Additional houses (300); borough architect, 28, The Square, Thistle Green, Stockton-on-Tees.

School kitchens and dining rooms at Marlborough Road and Maritime Street; borough architect, 28, The Square, Thistle Green.

Stoke-on-Trent.—Houses for T.C.;—Springfield, Trent Vale (62); direct labour. Riverside Road, Trent Vale (14); J. Kelly. Stonor Street, Cabridge (12); J. E. Homer & Co., Newcastle, Staffs. Riverside Road, Trent Vale (10); H. W. Cartlidge (Trent Vale), Ltd. Sutherland Road, Handford (2); Morgan Building Co., Ltd. Hollyhurst Farm, Fenton (6); W. Ball & Sons (Stoke-on-Trent), Ltd. Townsend, Bucknal (6); A. Hughes, Shelton, Stoke-on-Trent.

Surbiton.—Factory, Roebuck Road and Cox Lane; H. Hollier & Sons, 422, Garratt Lane, S.W.18.

Wakefield. — Laundry; Steam Laundry (Wakefield), Ltd., Grantley Street.

Walsall.—Workshop block at Walsall & Staffordshire Technical College; Hickton, Madeley & Salt, architects, Ashley House, Hatherton Road.

Warrington.—Schools, Dallam Farm estate, and girls' high school and R.C. secondary school at Latchford; borough engineer.

Woolston.—Junior and infants' school, for Lancashire E.C.; J. Rowse, architect, Martins Bank Building, Water Street, Liverpool.

West Bromwich.—Three storey flats (60), Hateley Heath estate, for T.C.; architect to Council, Hardware Street.